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ABSTRACT

This document contains the following papers on faculty development and technology: "Involving Faculty in Faculty Development" (Kristine Blair and Dan Madigan); "Technology Use in Higher Education: A Faculty Development Model" (Jessica Kahn); "A Faculty of Education as a Community of Learners: Growing to Meet the Demands of Instruction and Technology" (Nancy Browne, Mhairi Maeers, and Elizabeth Cooper); "Faculty Development: From Computer Skills to Technology Integration" (Karen Milligan and Stephanie Robinson); "Technology Mentorships in Higher Education: An Optimal Match for Expanding Educational Computing Skills" (Sally R. Beisser); "Constructivistic Learning: Also for Faculty!" (Simone Terwindt); "Building a Vision for Technology Integration" (Ann H. McCoy); "Teaching Well with Technology" (Kevin Barry, Barbara Walvoord, and Thomas Laughner); "Ten Years of Technology Training for Faculty" (Neal W. Topp and Robert Mortenson); "Teachers' Distance Professional Development and Support Model" (Peter Serdiukov, Dale Niederhauser, and Ralph Reynolds); "Teaching the Teachers: Faculty Development Institutes at Two Universities" (Marcus Childress and Ray Braswell); "The Evangelist and the Conscientious Objector--Lessons Learned from Faculty Development" (D. Lynnwood Belvin and Lawrence Baines); "Puzzled by Technology Professional Development? Which Pieces Fit in Higher Education?" (Ellen Newcombe and John Kinslow); "Aids and Cautions for Developers of Web Pages To Supplement Courses in Higher Education" (Cleborne D. Maddux); "Power Web Searching Techniques for Teacher Educators" (Judi Repman, Randal D. Carlson, Elizabeth Downs, and Ken Clark); "Interactive PowerPoint for Teachers and Students" (Terence Cavanaugh and Cathy Cavanaugh); "Networked Software Support of Staff Development" (David Baty and Raymond Moir); "Teacher Educators' Reflections on Using Group Response Technology" (Constance P. Hargrave, Anne Foegen, and Denise Schmidt); "Understanding Graphics for Effective Communication" (Jerry P. Galloway); "A Study of Two Online Learning Innovations: Implications for Teacher Education and Professional Development" (Herbert H. Wideman and Ronald D. Owston); "Teaching Old Dogs New Tricks" (Merylann J. Schuttloffel); "Frustration among Educators about IT Use" (Charlotte Bohrn and Urban Nulden); "The Impact of Information and Communication Technology (ICT) on Job Characteristics of South African University Academics" (A. Igonor and Y. Soul); "Building the

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Capacity for Systematic Integration of Technology in Teacher Education" (Rachel A. Vannatta and Blanche O'Bannon); "Integrating Technology into Preservice Teacher Education Method Courses: A Unique Business/University Partnership for Staff Development" (Ellen Hoffmann, Laura Rosenzweig, Joyce L. Morris, and Christy L. Faison); "The Unified Elementary ProTeach Program: Impacting UF and Beyond" (Colleen Swain); "Faculty Development and Preservice Teachers as Agents of Change" (Charles M. Savitt, Edward W. Hootstein, and Richard J. Rezba); "Faculty Development in Technology for Teachers of English for Specific Purposes (ESP) (Tatiana Slobodina); and "To Teach How or To Teach With: Four University's Approaches to Technology Integration for Teacher Preparation" (Kimberly A. Lawless, Louanne Ione Smolin, Neal Strudler, Scott W. Brown, and Steve Soulier). Individual papers contain references. (MES)

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Faculty Development

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FACULTY DEVELOPMENT

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As new communications technologies impact higher education, faculty must be trained to determine the most appropriate tools for design, support and delivery of courses. The challenge for continuing professional development and renewal to adapt to this changing environment has becomes critical. The adaptation of existing courses to implement new technologies requires faculty to use recently acquired knowledge and new skills. The standards for teachers supporting these new skills have been developed by the professional organizations governing accreditation in each academic field.

Both the International Society for Technology in Education (ISTE) and the National Council for the Accreditation of Teacher Education (NCATE), have specified the technology skills that teachers are expected to have when they enter the teaching field. These organizational standards provide the foundation for the professional development programs designed for higher education faculty. ISTE suggests that teachers be able to meet these standards: apply tools for enhancing their own professional use and productivity, use technology in communicating, collaborating, conducting research and solving problems, promote legal and ethical use of technology, use technology to support their instruction, and plan the delivery of instructional activities that integrate technology (ISTE, 1998).

The papers included in this section address a number and variety of approaches available to meet these new standards. The papers have been grouped into five areas: 1) Models for Successful Faculty Development Training; 2) Faculty Development Best Practices 3) Teaching The Tools of Technology; 4) Research and Case Studies; and 5) Faculty Development and Preservice Education.

Papers included in the Models for Faculty Development Training group provide a variety of faculty development models. They focus on the application of existing courses to implement new technology. These models are designed to prepare faculty for the transition from the traditional classroom to the technology rich environment supported by the ISTE and NCATE standards. A critical part of training is to expose faculty to models of technology use for integration and application of today's' technology tools. Blair and Madigan present a faculty development model that not only unites technology and pedagogy, but also presumes that faculty have a vital role in defining that model. Their description of their Center for Teaching, Learning & Technology chronicles the implementation of an integrated technology-pedagogy model. Kahn and Pred present the planning process, structure and outcomes of a project to provide information about the possibilities of technology to faculty in specific disciplines within the Southeastern Pennsylvania Consortium for Higher Education, a consortium of eight small colleges in and around Philadelphia. Browne, Maeers, and Cooper explore the experience of information technology inservice workshops at the University of Regina in Canada. A technology mentorship program designed to provide staff development for the teacher education faculty of a small liberal arts college is described by Milligan and Robinson. This mentoring program included the use of ISTE standards for preservice teachers in gauging the progress of the faculty that participated in the original program Beisser provides results from a specific technology mentoring experience at Iowa State University from the perspective of both the mentor and the mentee. Terwindt presents the development and implementation of a new curriculum concept for professional education at the Amsterdam Faculty of Education that has been termed "learning through producing". McCoy examines data gathered at the University of Alaska Anchorage School of Education to determine the state of faculty technology use for teaching and learning and establishes goals for further development of technology integration.

The second section of papers represents Best Practices in Faculty Development Plans. The best practice of current instruction must be preserved and renewed. Instructional and evaluative strategies that have been successful in traditional settings need to be examined and, if necessary, altered to continue their positive effects with students participating in situations with new technologies. Barry, Walvoord, and Laughner provide a Teaching Well With Technology workshop created to provide faculty members with a systematic way of thinking about desired outcomes, use of time and space, and potential impact of technology for their classes. Topp and Mortensen share the experiences of a college of education's 10-year effort to train faculty to

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use and infuse technology by means of its annual 1-3 week technology awareness and training sessions. The Distance Professional Development and Support System developed at the University of Utah Reading Center and reported on by Serdiukov, Niederhauser and Reynolds is designed to offer effective and cost-efficient teachers' professional development. Childress and Braswell address the faculty development programs at Auburn University Montgomery and Old Dominion University and the on-going evaluation of these programs. The authors also address problems perceived and overcome. Belvin and Baines report on recent research that included faculty perceptions towards technology and progress towards integration of technology into teaching. They have identified three categories of technology adoption and integration. The USE Tech Partners Program at West Chester University is geared toward full-scale integration of educational technology in teacher preparation. Newcombe and Kinslow present effective strategies, lessons learned through implementation, and future planned activities.

The third set of papers in this faculty development category center around Teaching the Tools of Technology. Teaching the tools of technology is necessary in the initial faculty development training that occurs. Training must be geared to the specific tools that support and supplement the educational mission of the faculty being trained. Maddux directs his paper to the developers of web pages to supplement traditional higher education courses and describes technical and content problems that limit the usefulness of web pages and the frustration that can occur for both students and instructors. Repman, Carlson, Downs, and Clark examine new search tools and techniques that teacher educators can use to improve the efficiency and effectiveness of their own web searching. Techniques include use of metasearch tools, improving relevance rankings with search engines, backwards searching, searching the invisible web, and use of kids' search tools. Interactive PowerPoint for teachers and students in the tool of technology presented by Cavanaugh and Cavanaugh provides specific information for the teaching of the tools of technology needed by faculty. Baty and Moir have developed a searchable on-line database of staff development material that relates to electronic teaching resources and which operates across the University network.

Section Four contains research and case studies involving faculty development and training. A study on teacher educators' reflections on using group response technology is presented by Hargrave, Foegen, and Schmidt. This study suggests that group response technology was an efficient means for all students to participate in class and for the instructor to monitor student progress during instruction. Galloway provides recent research on the teachers' use of graphics in HyperStudio screen displays. Graphic displays are analyzed and the use and application of graphic imagery is categorized into discrete levels based on their level of communication. Wideman reports on a study of the implementation of two telelearning projects based on different pedagogical models and using different delivery systems. A theoretical model of telelearning implementation is articulated and related to traditional views of program implementation. An action research methodology by Schuttloffel provides a self case study of a teacher education professor who investigates how to reconcile beliefs about classroom life with the implementation of technology. In the final analysis, the professor-researcher models to students her beliefs, hoping to shape the students' beliefs as future teachers confronted by innovative practice. Bohrn and Nulden describe a research project in progress about information technology use in education. They suggest how to initiate a discussion among educators to facilitate the start of a more substantial adoption of information technology in educational practice. Igonor and Soul report on a study concerning the use of information and communication technology conducted by South African University Academics. The impact of information and communication technology on job characteristics of teaching, research and administrative duties was investigated.

The last set of papers involves Faculty Development and Preservice Education. This dual mission of blending the training of the faculties of our Colleges of Education and the specific training programs for preservice teachers is of vital importance to all Colleges of Education throughout the higher education system. Funded through the U. S. Department of Education, Project PICT (Preservice Infusion of Computer Technology) was developed to enable preservice teachers to fully utilize modern technology for improved learning and achievement in their future classrooms. Vannatta and O'Bannon report on a model grounded in the collaboration between teacher education faculty, arts and sciences faulty, and K-6 teachers. Hoffman, Rosenzweig, Morris, and Faison discuss the Apple Summer Institute for Teacher Education attended by 42 participants who represented faulty teams from 17 universities. This panel discussion focuses on the results of this novel program in promoting institutional change within participating universities.

Swain describes the Unified Elementary ProTeach program at the University of Florida that is a new teacher education program with the potential to positively impact future teachers, public school children in the state of Florida, and the University of Florida community. Recent state legislation in Virginia requires teacher licensure programs to guarantee that graduating teachers are computer literate. In an effort to accommodate this mandate, faculty within the School of Education at Virginia Commonwealth University are analyzing the use of technology

in courses required for certification. Savitt, Hootstein, and Rezba discuss faculty development and preservice teachers as agents of change in light of these activities. Slobodina describes faculty development in technology for teachers of English for specific purposes by providing the current practices of faculty development in technology in Russia's universities and suggests ways of restructuring it to provide a high quality of university education in the new millennium.

The papers on Faculty Development describe innovative models and positive suggestions that have been designed and conducted to improve the use and integration of technology at institutions of higher education worldwide. Taken as a group, the methods and models provided will aid in the effective training of faculty and will address the critical need for continuing professional development and renewal to adapt to our changing technological environment.

References:

ISTE. (1998). National standards for technology in teacher preparation. [On-line]. Available: http://www.iste.org/Standards/index.html

Involving Faculty in Faculty Development: A Recursive Model

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Abstract: As more and more faculty are encouraged to develop technology-based courses within their disciplines as a response to changing student populations and the resulting need for alternative sites of learning, it is vital to create a faculty development model that not only unites technology and pedagogy, but also presumes that faculty have a vital role in defining that model. Using our Center for Teaching, Learning & Technology as a case study, this paper chronicles our implementation of an integrated technology-pedagogy model through the creation of faculty associate positions that allow faculty using technology across the disciplines to serve as liaisons among faculty and between faculty and instructional designers. In providing an historical overview of our Center's move toward this integrated model, we profile varying levels of support, resistance, and success encountered in establishing a faculty associate program, ultimately stressing the reciprocal benefits to the university community.

Introduction

One of greatest challenges to Faculty Development Centers in post secondary education is how to incorporate technology into the practice of teaching without sacrificing either the technological or the pedagogical mission of the University. Many models within faculty development centers address this challenge by foregrounding one teaching-technology model at the expense of another. Sometimes when technology is involved in developing course materials traditional faculty development centers play a minor role if any. For example, one model may involve a faculty member "dropping off" course materials at an instructional media center to be technologically transformed for presentation purposes. This model may also presume that course materials need only be visually appealing and accessible in order to be pedagogically sound. In addition, such a model often views the use of instructional technology from a top-down perspective in that technology enhances a one-way monologue from teachers to students. A related model involves placing instructional media centers within or near faculty development centers. The initial missions of both centers presume and encourages a separation between technology and pedagogy. More recently, some faculty development centers have realized the importance of collaborations in which other experienced faculty from a variety of disciplines across campus work as consultants to instructional designers within one combined unit. Yet even within these more current models, faculty are viewed as content experts but neither technological nor pedagogical experts. Although each of the above models appear to integrate teaching and technology, there exists a continued bifurcation.

As more and more faculty are being encouraged to develop technology-based courses within their disciplines as a response to changing student populations and the resulting need for alternative sites of learning, it is vital to create a faculty development model that not only unites technology and pedagogy, but also presumes that faculty across these disciplines have a vital role in defining that model. Thus it is important to ensure complete integration of technology and pedagogy from the initial planning stage of course development through the implementation and assessment stages so that faculty have an equal and reciprocal role in the creation of technology-based learning options appropriate to their teaching styles and curricular contexts.

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Indeed, any form of instructional consultation should be recursive and, as Weston and McAlpine (1999) suggest, should "integrate more disciplined-based concerns and faculty involvement" (p. 85).

Although in some cases, the possibilities and constraints of implementing any model of faculty development across campus are often budgetary, there are also those ideological constraints that maintain the separation of technology from pedagogy. From a faculty perspective, this may include the view that technology requires functional knowledge of hardware and software applications, and is therefore beyond the average faculty member's teaching responsibilities. From an administrative perspective, there are often concerns about offering incentives to faculty for appropriate uses of technology in curricular development. These concerns are particularly significant in light of traditional tenure and promotion structures that may fail to encourage and reward faculty who recognize the importance of technological teaching and learning forums (Gilbert, 1996). For technological literacy educators such as Cynthia Selfe (1998), it is simply no longer enough to ask colleagues to utilize technology and reward them for doing so: "Instead, we need to... provide them with important opportunities to participate in making hard decisions about how to pay attention to technology issues in departments, colleges, and local communities" (p. 434).

Using our Center for Teaching, Learning & Technology as a case study, we show how we have implemented an integrated technology-pedagogy model through the creation of faculty associate positions that allow faculty using technology across the disciplines to serve first as liaisons between faculty and instructional designers then as members of creative development teams. In this model, faculty associates, instructional computing designers, and other faculty development personnel, including student network specialists and multimedia designers, work as a team toward a common goal of helping faculty recognize the potential of technological teaching environments to foster active teaching and learning styles.

As this paper demonstrates, the integrated role of the faculty associate includes actively involving discipline specific faculty in planning workshops and other public forums for critical dialogue about integrating, preparing, and evaluating technology-based teaching. Faculty associates also serve as consultants to individual faculty seeking to implement technology into teaching and learning. In providing an historical overview of our Center's move toward this integrated model, we highlight the varying levels of support, resistance and success we have encountered in establishing a faculty associate program. Ultimately, in addition to the benefits for our own faculty development center, we stress the reciprocal, interdisciplinary benefits to the faculty associates, their departments and colleges, and to the larger university community.

Historical Overview

Many factors have contributed to our Center's vision regarding the successful and responsible use of integrating technology into the teaching culture at our university. It would be irresponsible for us to imply that our current vision was the vision we began with at our Center for Teaching, Learning and Technology three years ago. Although the president of our university played a pivotal role in helping to create a faculty development center that focused on all faculty development issues, including responsible use of technology for teaching, our directives were unclear. During the first year of existence, members of our advisory board (faculty, students, and administrative staff personnel) spent several months debating our vision and mission. Common questions during those early meetings were, How much technology should the Center focus on? Should the Center be involved in instructional design? How much time should the Center and its staff of two devote to technology issues? How much time should the Center and its staff devote to other more traditional faculty development issues? In response to the confusion of those early months, the director and assistant director designed a series of technology workshops and a second series of more pedagogically focused workshops. And although they tried to combine technology and teaching issues in every workshop and consultation, more often than not the two sets of issues became distinct and separate, just like the two sets of workshops.

In the second year of existence, and in answer to a technology/teaching separation model, we sought to informally benchmark (Epper, 1999) our teaching/technology faculty development profile with profiles from other universities and businesses that were successful in integrating teaching/technology models. We visited faculty development web sites worldwide, and we made visits to several campuses state wide, nationwide, and in Canada that had developed faculty development centers that integrated instructional computing design with pedagogy. Our benchmarking activity revealed that only a few faculty development centers we encountered had implemented a teaching/technology model that was fully integrated. We learned that the faculty development

programs that came closest to an integrated model that we now implement always involved cooperation between faculty associates, instructional technology experts, and faculty development centers. In response to the benchmarking activity, we began to involve more faculty in facilitating our workshops. We hired student technology experts to work with faculty on teaching/technology projects. We also investigated systems, hardware and software that would allow faculty to integrate technology into their curriculums more fluidly. Finally, we began to envision an integrated program that involves faculty associates, instructional designers, and students in a team environment. As a result of our benchmarking venture, our staff began to refine our vision and our Center's mission.

What we didn't expect in the beginning of implementing our new model is some of the resistance we encountered from a variety of areas. For example, some faculty became vocal about not wanting to use technology in their teaching. Because new instructional technologies have only recently begun to change the way we communicate, distribute resources and share ideas with students, our university did not have a system in place three years ago to support faculty teaching/technology efforts. Even two years ago, some of our faculty did not have easy access to the Internet from their offices or from their homes. Nor did faculty have access to knowledge about how technology and teaching were joint initiatives in relation to instructional design and curriculum development. Some key administrators on campus had developed a resistance of their own toward an integrated model. Primarily, they were used to faculty development centers in which technology was bifurcated from traditional faculty development issues: Curriculum design, classroom management issues, and assessment. Thus they themselves had little experience in facilitating innovative uses of technology in teaching and learning.

Although in the beginning this kind of resistance worked against the integrated faculty development model, we came to understand and learn from some of the issues related to the resistance. We learned that faculty needed better technical assistance and access in their daily teaching and research routines. We learned that they needed a secure environment in which to distribute course content and communicate with students and colleagues. We learned that they needed and wanted forums for discussing and assessing appropriate and responsible uses of technology for teaching and learning. We learned that they needed a reward structure consistent with their discipline specific guidelines for toward tenure and promotion. From what we learned, we fashioned the faculty associate program that we detail in our next section.

Implementing an Integrated Model

Fostering a reciprocal relationship between faculty and our Center staff has involved a triangulation of forums that are meant to complement one another and contribute to our theoretical goal of integrating technology and pedagogy, including theoretical seminars, individual consultation, and hands-on technological training.

Technology/Pedagogy Seminars

Once we hired our current faculty associate, the Director, a newly hired coordinator for instructional development, and the faculty associate brainstormed ways of encouraging faculty to become more actively involved in discussions relating to effective uses of technology in the classroom. In our first phase of the program, our faculty associate coordinated three special topics seminars meant to contextualize online teaching around issues of development, management, and assessment. The first session, "Integrating Technology in Teaching and Learning: Perspectives and Problems," was co-presented by the faculty associate, an English professor who utilizes web-authoring tools in electronic writing classrooms, and another faculty member in communication studies who utilizes web-based communication technologies in large lecture classes, with each demonstrating their web-based course materials and communication forums. The workshop addressed the question of when and why to use technology in teaching, as well as how to develop online pedagogies that foster alternative learning formats. To facilitate interactive discussion of these questions, breakout sessions allowed faculty to brainstorm online pedagogical possibilities appropriate to their instructional formats and disciplinary content and to share their discussion with the larger group.

A second session, "Preparing for Online Learning: Course Management Possibilities," asked participants to consider what course materials they commonly utilize in teaching and which ones would be suitable for online distribution. Similar questions addressed the advantages and disadvantages of transferring communication strategies between teachers and students as well as among students themselves from a face-to-

face setting to an online forum. In addition to a hands-on opportunity to work collaboratively with faculty from a wide range of disciplines--Geography, Family and Consumer Sciences, Art--a team of course developers shared their experiences in planning and implementing a totally online philosophy course, first as a pilot course and ultimately as a successful multi-sectioned offering in the department.

Finally, a third session, "Evaluating Student Learning Online," addressed the ways in which various technologies available to teachers, from e-mail to the World Wide Web, can be used both as tools for student assessment and as forums for student self-assessment and course evaluation. Faculty presenters included a music professor who utilized online quizzes for the assessment of basic concepts and a technical communication professor who employed electronic portfolios of student work in a course on online documentation. Despite the differences in curricula and online assessment options, both faculty stressed the preparation required in developing and monitoring online assessment strategies and helped faculty to consider the ways in which students could participate in evaluating the success of their own online learning to aid in curriculum revision and general assessment options.

Rather than foster uncritical enthusiasm for online learning forums, however, these sessions encouraged faculty to question the relative contribution of technology to both curriculum and instruction. For instance, an education professor attending the workshop was skeptical about the role of online discussion forums in fostering dialogue. While the professor could see the benefits of online groups for larger, lecture-oriented courses, he already had a smaller class of thirty students for whom creating and managing face-to-face group activities seemed sufficient. A follow-up email the next day from this professor to the faculty associate co-presenting at the seminar revealed a more reflective stance, recognizing the benefits of online discussion for a summer course in which some aspects of the curriculum could function online as well as face to face. Instead of wholeheartedly embracing this online alternative, the professor expressed concern about the perception by others in his department, as well as his own students, that he wasn't teaching because the class would not always be meeting in the traditional face-to-face environment. Currently, our Center staff has worked with the faculty member in identifying technological options to match his pedagogical goals, maintaining both a face-to-face and an email dialogue for his questions and concerns. As this example demonstrates, the successful integration of technology into the curriculum requires support of the faculty member's academic labor by students, colleagues, and departmental and college administrators whose ideological values about teaching and learning may be steeped within a traditional, teacher-centered educational paradigm.

Individual Consulting and Technological Training

Our faculty associates consult with discipline-specific faculty to establish a sense of continuity between the technology/pedagogy workshops and the actual application to classroom practice. In these consultations, the faculty associate and a Coordinator for Instructional Development, both with shared expertise in technology and pedagogy, facilitate dialogue with faculty about what teaching and learning forums they currently employ; what technological forums are available to foster equally successful student learning opportunities; what preparation is required by faculty for effective utilization of online teaching environments; and what additional training, in the form of online tutorials and hands-on workshops, will assist the faculty member in the development process.

Despite the apparent benefits of this program, Barone and Luker (1999) remind us that "Tensions on campus run high as institutions of higher education face social and economic pressure that their cultural and value systems, embedded in traditional modes of instruction, do not accommodate" (p. 68). As a result of this pressure, faculty can sometimes be caught up in the *rush to technologize*, a situation in which the *whats* and *hows* of technology are more important than the *whys*. And because, as Barone and Luker further note, "The classroom lecture and its concomitant social relationships have been dominant forms in universities for centuries" (p. 68), faculty may initially have a more transparent view of technology. From this perspective, technology is simply another medium of the traditional mode of instructional delivery. This contrasts to a view that holds technology as potentially transformative educational media, the co-production of knowledge between teachers and students. Even for those faculty who hold this latter perspective, however, it is important to remember that simply to "add technology and stir" does not ensure a recipe for transformative educational practice. Techno-pedagogues such as Donna LeCourt (1998) stress the need to challenge links between transformative pedagogy and computer-mediated instruction that presume computers to be defacto tools of educational empowerment. In response to such concerns, we encourage faculty to plan their online course components in ways that allow for participatory learning. Examples of this might be the use of online forums for group projects, or online surveys to allow students to provide midterm feedback about a course.

In these consultations we also stress that integrating technology can and should be progressive, not requiring technological mastery on the part of faculty. The belief that that faculty must be masters of technology in order to teach with technology may discourage them from developing technological learning forums in the first place, fearful of the loss of their status as *experts*. For instance, in a study comparing writing instruction in traditional vs. computer-mediated environments, Palmquist et al. (1998), noted that "One of the most common concerns teachers express is that they will not know how to help students..." as well as concerns about "losing face in front of students" (p. 9). To aid in developing more technological knowledge, each consultation addresses the necessary skills-building process for a faculty member's successful integration of technology in the classroom. Skill-building can be both self-paced, where a faculty member can work with a student technology consultant, or involve workshop-oriented activities in which faculty attend sessions that provide hands-on training. Regardless of whether training is individual or group based, the faculty associate ensures that even within these skill-based sessions, technological training and pedagogical concerns continue to be co-equal. In the case of workshops, the faculty associate secures additional faculty participants who use technology in their teaching and who are invited to demonstrate various online materials within the workshops, sharing time with the instructional development coordinator who conducts the more skills-based training within these sessions.

Conclusion

Throughout the range of theoretical seminars, individual consulting, and hands-on workshops, our integrated model presumes the role of faculty, faculty associates, and instructional/technical designers as members of a creative development team. While Moore and Kearsley (1996) suggest that faculty scheduling demands may initially make them reluctant members of the team and limit their role as designers in terms of both willingness and expertise, our experience has been that the role of faculty in this process must be that of both instructor and co-designer in order for the technology-based course development process to be effective. In addition to providing the theoretical and practical training for such teamwork to occur, we also see the importance of Moore and Kearsley's call for technical and instructional design staff, including faculty associates, to themselves become knowledgeable about the criteria for effective technology-based learning. While some of this knowledge comes from formal courses and self-instruction, it must also stem from a willingness to listen and learn from faculty, administrators, and students across the disciplines. For members of our Center's staff, this knowledge-building has a direct impact on their professional development, for just as Owen Hicks (1999) suggests, those serving as consultants often attest to the improvements in their own instruction "that occur as a result of acting as advisers to colleagues" (p. 15).

Yet in order to support the integrated model we have described throughout this paper, we depend upon continued institutional and philosophical support for our Center's technology/pedagogy initiatives. For example, our English department is supporting our current faculty associate by working jointly to consider the possible impact of the this position not only on her individual teaching and scholarship but also on larger departmental initatives, including the development of online courses as well as grant-writing projects to fund such initiatives. In addition, our philosophy department granted a course release for one faculty member and provided a graduate assistant for another faculty member to develop web courses to meet the needs of student populations both within and outside the university. At the college level, our graduate college has recognized the importance of supporting faculty associate positions from a variety of disciplines. Thus they have allocated funds for three additional faculty associates for the upcoming year. Moreover, our Center has initiated regular dialogue among Deans to discuss the value and changing reward structures for both academic units and individual faculty attempting to integrate technology into instruction. This also includes adding two associate deans to the Center's advisory board to better involve them in the existing dialogue, a process that supports and reaffirms our mission. Without continued self-assessment of the recursive benefits to the faculty associate, the faculty development center, and the university, the model remains static, rather than a dynamic response to discipline-specific goals. Finally, without these varying levels of support from those administrative units providing the funding and those faculty and departments directly benefiting from our current and future technology/pedagogy initiatives, the model cannot succeed.

References

Barone, C., & Luker, M. (1999). The role of advanced networks in the education of the future. *Educom Review*, 34 (6), 44-46, 68-74.

Epper, R.M. (1999). Applying benchmarking to higher education: Some lessons from experience. *Change*, 31 (6), 24-31.

Gilbert, S. (1996). Making the most of a slow revolution. *Change*, 28 (2), 10-23.

Hicks, O. (1999). A conceptual framework for instructional consultation. *New directions for teaching and learning*, 79, 9-18.

LeCourt, D. (1998). Critical pedagogy in the computer classroom: Politicizing the writing space. *Computers and composition*, 15 (3), 275-295.

Moore, M., & Kearsley, G. (1996). *Distance education: A systems view*. Belmont, CA: Wadsworth.

Palmquist, M., Kiefer, K., Hartvigsen, J., & Goodlew, B. (1998). *Teaching writing in computer supported and traditional classrooms*. Greenwich, CT: Ablex.

Selfe, C. (1998). Technology and literacy: A story about the perils of not paying attention. *College composition and communication*, 50 (1), 411-436.

Weston, C., & McAlpine, L. (1999). Toward an integrated approach to instructional consultation. *New Directions for Teaching and Learning*, 79, 85-95.

Technology Use in Higher Education: A Faculty Development Model

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Abstract: Higher education faculties have been slow to integrate technology into their college courses. In a single small college, the logistics of providing the information professors might need about technology in their subject areas are daunting. The result is that the integration of technology into college courses is a haphazard process, fueled only by the enthusiasm and commitment of individual faculty members.
This presentation will present the planning process, structure and outcomes of a project to provide information about the possibilities of technology to faculty in specific disciplines in an eight-college consortium.

The Southeastern Pennsylvania Consortium for Higher Education (SEPCHE), a consortium of eight small colleges in and around Philadelphia obtained funding from a private foundation to educate their faculties on the use of technology (web resources and software) in their college teaching. The pilot program, which took place in January of 1999, consisted of two workshops, one for education faculty and one for science faculty, held simultaneously on two of the eight college campuses. Subsequently, funding was obtained from the same foundation to do six other workshops in January of 2000, also simultaneously, on the six other campuses. These workshops addressed the following topics: Psychology and Sociology; Art; Business, Mathematics and Economics; Nursing and Allied Health Professions; Philosophy, History and Theology; and Languages and Literature. One objective of the workshops was to educate college faculty about ways to integrate technology into their courses. A second objective was to create an opportunity for faculty members from the eight separate campuses to collaborate on an academic task. The overriding objective of the workshops was to improve the quality of the college education provided on each of the eight campuses. This paper presents a model for doing such faculty development, and describes the results when this model was used.

Needs assessment survey

The first step was to survey the faculties of all eight colleges, to find out what equipment they had, what use they made of it, and how technology was used in the courses taught at each college. The survey made it clear that most faculty members knew enough about word processing and other applications to use technology to do their own work – e.g., record-keeping, syllabus creation, desktop publishing. It was also clear that the lack of equipment and infrastructure (Internet connections in offices and classrooms) was a significant factor that kept faculty from making more extensive use of technology in their teaching.

The survey showed that teachers did not use technology in their classroom teaching. It was decided to design workshops in which teachers could become acquainted with websites and software for their

disciplines. We reasoned that browsing time was needed, in an environment where technical support was readily available. We also determined that a discussion of assignments and strategies for including technology in college courses would be helpful. This would be an opportunity for faculty members from all of the eight colleges in the consortium to get to know each other and to exchange information on the ways in which they each individually included technology in their courses.

Planning the workshops

Notifying faculty

We received the grant from the Barra Foundation, designed to pay two people to plan and conduct the workshop, 25 to attend, three to present software or Internet activities, and one to evaluate the workshop. We designated two people to plan and conduct the workshop so that the workload would be shared and so that the workshop would not be jeopardized should one person be unavailable (e.g., due to sickness or family emergency) We planned the workshops for the January intercession. We chose that time because everyone would be available to attend two days of workshop sessions, and it would be possible for professors to think about the classes they were planning to teach that spring, and make slight adjustments in their assignments.

In September, a notice was sent out to all education faculty members at all eight colleges, informing them of the dates of the workshop. Notices were also sent out to department chairs. In these notices, chairs were informed that they would be asked to choose three members of their departments to attend the workshop, and also to identify possible presenters.

By October 15, signup sheets had been mailed to all education department chairs, asking for the names, addresses, phone numbers (home and work), and social security numbers of workshop participants.

Gathering materials

During the fall of 1998, the directors of the education faculty workshop began collecting handouts to be used during the workshop. We found handouts that identified websites for specific topics (children's literature, instructional planning), as well as handouts on evaluating software and websites, and on using search engines.

Selecting evaluators

An evaluation team designed a evaluative survey to be administered during and after the workshop. Both quantitative data (a Likert scale questionnaire) and qualitative data (solicited comments on the questionnaire and unsolicited comments during and after the workshop) were collected and analyzed.

Conducting the workshops

The first two workshops took place on January 6 & 7, 1999. Twenty-four professors, representing all eight colleges, took part in the education workshop. On Wednesday the workshop was structured so that each participant had his or her own computer, thereby insuring that each person learned how to access websites and so forth. Even so, considerable collaboration took place almost immediately as members of the group showed each other what they had found or helped each other deal with problems. A technical expert was available to help deal with problems. On Wednesday, at the end of the day an evaluation form was distributed, and participants were reminded to bring a syllabus from one of their courses to the workshop on Thursday.

Presenters were volunteers from among the faculty participants. One demonstrated the use of a commercial website for setting up a webpage. A pair of presenters talked about educational software, some of which was available in the lab for preview. On Thursday morning, an assistant professor illustrated the use of a website to articulate a concept addressed in her Educational Psychology class. The workshop leader described the final task, which was to create an assignment that involved the use of web technology. Each participant was encouraged to work with another professor teaching a similar course at another college. By the end of Thursday afternoon, all the workshop participants had presented to the group

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assignments they had designed for use in their college courses. All of these assignments involved the exploration and examination of web resources.

Evaluating the workshops

Quantitative evaluation

Evaluations were done at the end of each day, consisting of a questionnaire that participants filled in and signed (copies of the questionaire are available upon request from jkahn@mciu.org. In addition throughout the two days, individuals commented that they valued the time to explore websites and also the time to work with each other. They mentioned the quality of the handouts, and the wealth of valuable addresses and information they had received.

Statistical analysis of questionnaire data was conducted by the project evaluator, Robert Pred. Some observations about the data are offered here. Items 1-7 remained constant on both the Wednesday and Thursday questionnaire. Scores on all items improved on Thursday, which we understand to indicate an increase in the level of comfort and sense of competence of the participants. To enhance the reliability of assessment, Items 1-7 were summed to form two scale totals, one for each workshop day. The average scale score obtained from participants on the second workshop day was higher than the average scale score for the first workshop day. This increase was shown to be statistically significant using a repeated measures methodology. A paired samples t-test showed significant improvement ($p < .01$, t paired samples test = -3.359, df= 16, 2-tailed significance = .004) in the scale scores over the period of two sessions.

Items 8-10 on Day One addressed issues of incorporation, and the content in question was various websites, which participants had explored, perhaps for the first time, that day. They responded that they would not only be comfortable using websites in their teaching but overwhelmingly indicated that they would use websites and could see value in doing so. For example, over 95% of participants indicated "Strongly agree" when responding to the opinion expressed in Question #10 (I clearly see benefits to incorporating the use of the World Wide Web in developing my courses).

Items 8-10 on Day Two addressed issues of usage, but also asked professors to assess the value of the structure of the workshop and the value of the content of the workshop for their particular teaching situations. One hundred percent of respondents agreed with the statement in Question #8 (I was introduced to websites/software that I feel can be useful in my courses). In addition, over ninety percent of respondents agreed with Question #9 (Working in groups to learn new software with professors from other institutions was valuable). To Question #10 (I was able to design some valuable activities for my course(s) using the software), ninety-five percent indicated agreement.

It was also interesting to note that, when asked in what courses faculty members would use technology, all respondents named two or more courses (they were given four blank lines), although the assignment of the workshop had been to design an activity for just one course.

Qualitative evaluation

The qualitative evaluation reflects the enthusiasm that was apparent during the course of the workshop. Participants were involved in their activities, using the information that had been supplied to pursue their own interests. They also shared what they had found with colleagues from their own campuses as well as with new acquaintances who taught similar courses on other campuses. The energy level was high, conversations were animated, and handouts were accumulated and carefully consulted. Even frustrations when websites were not immediately available did not dampen spirits.

All participants designed activities for use in their courses and presented their activities willingly for the other participants. Many participants partnered with one or more colleagues from other colleges in order to complete this assignment, working together for the first time in most cases.

There was space on the bottom of the questionnaire for "additional comments about this workshop." Thirteen of twenty-two participants used that space and the comments were entirely positive (one person

asked for a juice break). We also asked participants if they would be willing to identify themselves so that we could conduct a brief follow-up survey. All participants contributed their names and phone numbers to a database, and seventeen professors indicated willingness to take part in a follow-up survey.

Participants' written comments identified several valuable components of the sessions. Faculty members identified the time to explore the World Wide Web by themselves as being valuable. It is our assessment that this time was made more productive because they had reference materials about search engines, Web addresses, and especially the support of an instructional support person who answered technical questions.

The chair of the education department at one college wrote:

> "Please accept my commendations for a well-planned workshop! The organization of topics, as well as the delivery methodology was appropriate for the neophyte as well as the seasoned Internet traveler. The handouts were valuable and will provide a vital resource when we implement the skill that we acquired. The individual help that you gave us was very much appreciated. Once again thanks for such a valuable program."

Another identified value of the workshop was the opportunity to work with colleagues from other campuses. A good example of this is the following comment,

> "This was an outstanding two days – the opportunity to explore technology applications and to network with other education faculty."

One participant wrote specifically about the value of meeting professors from consortium colleges with whom she could share expertise. This respondent chose to identify herself (as almost all respondents did) so we know that she was one of the presenters. She had demonstrated a sophisticated use of Web resources for the rest of the group. It would have been understandable if she had complained that she had not learned anything new, but in fact, she reported that she found the experience valuable in its collaborative aspect, and suggested a follow-up session.

> "Really good to meet others teaching similar courses at other colleges. I like this kind of workshop where we had time to interact with those who teach same subjects. I wish we could have another session in a few months in which we came with something we have accomplished in our class as a result of the work we did today, and share that with 1) our subject area colleagues and 2) all of the other professionals in this workshop."

The enthusiasm with which the workshop was generally received is illustrated by the following remark:

> "The two-day professional development sessions were very beneficial to me. Very practical and very appropriate! Great job!"

There were unsolicited notes and email messages from seven participants. Each of these comments was in a personal note addressed to the workshop leader indicating that they felt so positively about the experiences offered at the workshop that they took the time and effort to provide additional feedback.

One participant wrote,

> "I want to thank you for your preparation, your enthusiasm, and the valuable learning provided. Your work was a real and professional service."

Another participant wrote:

> "The workshop was great. In addition to previewing the Early Childhood Education software, I obtained some great articles and titles of texts that I can use for these new special education courses...We all seemed to enjoy the fellowship as well."

Still another participant indicated that she would use what she had learned immediately in her courses.

> "As a result of our workshop, I am revising my own syllabi in my language arts courses to integrate more projects and assignments using website resources."

In planning for the next six workshops, we kept in mind the lessons of the first two. It did not seem to matter that participants varied widely in the level of their experience and comfort with the technology. It did not seem to matter that they came from different campuses with different levels of technology available to them. What did matter for them was that they were provided with time, resources and structures that made it possible for them to explore and use what they found to improve their teaching. They perceived that their level of knowledge and comfort regarding this technology increased substantially over the course of the workshop. They also began to understand new ways to incorporate technology into their courses. Participants suggested possible topics for follow-up workshops and indicated their willingness to attend such workshops.

This model has several features that seem to be critical. These components are 1) the subject-specific nature of the workshops; 2) the pedagogical focus; 3) the balance of structure and exploration; and 4) the opportunity to collaborate. Each of these factors had something to do with the success of the first two workshops, and each has been built into the next six workshops. Faculty again are organized into groups with those who teach the same subjects at the other colleges, and technology resources specific to those subjects are being gathered for presentation. We again suggested that faculty members each bring a syllabus and design an activity, and we provided guidelines for structuring and assessing those activities. Within the two-day workshops, we again provided opportunities for exploration of websites as well as structured presentations and tasks to be completed and described. We encouraged faculty to work together on their assignment with their counterparts from other campuses, creating an opportunity for conversation and collaboration.

By any measure of success the first two workshops qualify. Assessment data from the next six workshops will be analyzed at presented at the SITE2000 meeting in San Diego, and will be available by email from jkahn@mciu.org. We had specified four outcomes for the workshops in our original proposal, and informed participants of these outcomes in a handout that read as follows:

The purpose of these workshops is to bring our faculties together to collaborate on the creation of web pages and to review software. Faculty will identify and assess web sites and software, and consider ways to integrate technology into their various college courses. If the pilot program is successful and additional funding is obtained, workshops for six other discipline groups will be scheduled on the six other campuses for the winter of 2000.

There will be four separate outcomes of this project.

1 *The creation of working relationships among the members of our separate faculties as they discuss their syllabi and assignments.*

2 *The creation of a nucleus of computer-using educators who can return to their individual campuses and serve as resources for other faculty members.*

3 *The creation of Web pages to provide faculty members with a lasting resource of their own invention.*

4 *The enrichment and improvement of education courses by the thoughtfully designed use of technology.*

It is clear from participants' comments that the first outcome was achieved. We have described the ways in which these working relationships evolved over the two-day period. We expect to find evidence that the second outcome has been achieved when we do follow-up surveys. Certainly during the initial two workshops our participants served as resources for each other, and we expect that they will stay in touch and maintain some level of interaction as they need to. We did create an Education faculty Web page, which can be found at http://www.chc.edu/sepche.htm/. This Web page identifies sites selected by participants and organizes them by topic (reading, mathematics, special education and so forth) as the participants suggested. Finally, we are certain that faculty members from each campus will be incorporating technology into their courses in ways that help them accomplish their instructional goals.

We began this project with the expectation that professors of the SEPCHE consortium would benefit from a workshop in which they had both sufficient time to explore Web and software resources and an extended opportunity to talk to each other about the courses they teach and the resources they use. Every indicator we have shows us that we were entirely justified in this expectation.

A Faculty of Education as a Community of Learners: Growing to Meet the Demands of Instruction and Technology

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Abstract: This paper explores one Faculty of Education's experience with Information Technology inservice workshops. Expert students knew the IT content and expert faculty worked with the expert students to 'deliver' the content to the faculty and to debrief and extend the discussion to appropriate classroom learning using IT. A Community of Learners model was used, along with cooperative learning and social interaction, to develop the faculty members' understanding of IT skills and curriculum appropriate use. Recommendations for other faculties embarking on a faculty IT journey are included.

Introduction

For several years our Faculty of Education has offered short workshops introducing faculty to new software and hardware so that we can learn to use the resources and their capabilities in our research and teaching. In the last couple of years, the World Wide Web and faster processors have meant that new developments and technologies have emerged at a very fast rate, and we who are teacher educators have had to devise new ways of working together so that our program is also developing rapidly in relation to technology and its many educational possibilities. At the University of Regina, our desire to learn about and with technology was in part initiated by the context in which we work: a provincial context where Directors of Education and others have told us that schools require new teachers to be competent in the instructional uses of technology, an institutional context that changes slowly (see Maeers, Browne & Cooper, 1997) and includes students with a wide range of technological skills and abilities, and a curriculum context where resource-based learning is central. Technology is considered an important resource for teaching because of the extensive electronic on-line curriculum -- located at http://www.sasked.gov.sk.ca (see Maeers, Browne, & Cooper, 1997, 1999, and Couros, SITE 2000).

Some teacher education programs in Canada have mandatory computers in education courses and some provinces require that for teacher certification purposes all students must take a computers in education course. Other countries (for example, USA) have national and/or state teacher accreditation standards for information technology. In the province of Saskatchewan we have no external technology

accreditation or graduation requirements, and this has freed the Faculty of Education to incorporate technology in ways where we see the best fit with curriculum and instruction.

Since we are well acquainted with our provincial and institutional context, some faculty members in curriculum and instruction areas have developed a vision of the technological path to follow. For example, the authors designed an action plan to be implemented over the four-year concurrent Bachelor of Education program (see Maeers, Browne, & Cooper, 1999). Also, we have had supportive administrators who have seen the necessity of funding technology innovations. Our vision and action plans are more focused on the integration of technology into the curriculum, and on developing the pedagogy that supports appropriate use of technology as a resource for learning. We understand that our plans will continually undergo regular revision as technology and contextual changes occur.

In assessing what to do, we realised we had the vision, the action plan, the hardware and software resources, an efficient state-of-the-art Internet and multi-media computer lab, and the curriculum experts. These curriculum experts, however, constituted a mostly middle-aged faculty who would have to ascend a steep learning curve in order to pursue any technology vision. We lacked the technological skills to use the resources that we had and lacked the time to think through and work out the pedagogical application of our newly acquired skills. We knew that acquisition of skill knowledge would be a relatively attainable goal with these experienced learners, and that, given an opportunity to experiment with the technology resources, curriculum appropriate educational applications would follow.

Well aware of the need to create a safe space where faculty could learn the skills in relation to particular applications, the authors envisioned offering workshops where faculty could learn the skills and then immediately discuss how to apply them to teacher education situations. These workshops would be education-oriented rather than skill-oriented. For example, e-mail has been taught on campus, but we wanted to discuss with our colleagues the teacher education and school applications of e-mail, such as e-pals, electronic mentoring, and ask an expert.. This teacher education focus was an important part of our workshop approach.

We used a community of learners approach to implement the faculty inservice (Rogoff, 1994). This approach is founded on a leadership which listens respectfully, takes people's problems seriously, promotes roles that are asymmetrical, and provides for a variety of learning styles and needs. This approach follows a tradition of collaboration and shared responsibility that is well established in areas of our faculty.

We debated who should teach the workshops and hiring a consultant was considered. We knew that such a person could teach the skills, but were less sure about their ability to make the connection to education and apply the skills in the specialised curriculum areas. We resurfaced the idea of having expert students teach faculty (in 1995 the authors had participated in a conference called New Frontiers for Education, a conference focused on technology in the classroom, where many conference sessions included school students as presenters). We were confident that technologically-skilled students (in this case Education students) could teach us the skills, but again, we had concerns about their ability to make the connections to education. In the latter option, we could see the benefit in discussing the educational connections together, while we learned the technological skills from them. As reciprocal mentors, we would work together on making the educational connections. Using Vygotsky's notion of social interaction and learning (Krauss, 1996), and the idea that what one can learn cooperatively today (from a more experienced learner) one can do alone tomorrow, we hoped that this pairing of students and faculty would provide both groups with the knowledge and attitudes to independently learn the skills and apply them in appropriate curricular ways.

We designed 12 workshop topics and implemented six of these in group workshop situations in the computer lab. We hired six technology advanced students and each student selected two workshop topics to research, create a handbook for, and work with us to develop a plan for how they would teach their topic to faculty. Workshop topics included: advanced word processing, advanced e-mail, advanced web searches, web page development, drawing/painting programs, multi-media authoring, spreadsheets and data bases, subject-specific software, presentation software, newsletter publication, distance education, and WebCT. The workshops were quite successful in drawing people out of their offices into the computer lab, in developing skills, and in the application of these skills to curriculum areas. The reasons for the success lie in how the faculty learned from the expert students and from each other, and in how faculty members were able to apply the learning in their courses.

The development and enactment of the faculty workshops has followed a process similar to other curriculum innovation projects in our faculty. The details of this process will be divided into three sections: developing a sense of a community of learners, understanding the necessity of invisible work, and refocusing on instruction—asking how could technology be used as an effective instructional tool?

A Community of Learners.

In Barbara Rogoff's (1994) explanation of a community of learners approach she describes the workings of an Arizona school based on this philosophy. From this experience she lists and describes several criteria for a community of learners approach. The community of learners model provided us with guiding ideas and tools for analysis as we came to understand our faculty's progress in learning about and with technology. Her criteria are italicised in the following text.

Some faculty members knew what they wanted to learn and others needed assistance in devising their learning goals. We wanted the workshops to be relevant to people's work and we wanted to *foster inherent interest.* One memo said "You may not know specifically what you want to learn, but you know that you would like to feel more comfortable either using the computer for yourself or using them in your classes. Please let us know if you would like someone to consult with you as to potential areas of learning." Twelve faculty members (out of a total 45) asked for individual consultations to help them decide what they wanted to learn, about twelve other faculty members listed what they wanted. We contacted those needing consultation people and helped them select, and compiled a list of everything that everyone wanted (resulting in the above 12 workshop topics). This compiled list was once again distributed to all faculty—those who had told us what they wanted requested more than they had initially stated. This list also helped some faculty who had not previously listed a topic now list one or more workshops they would like to attend. Initially 20% of faculty responded, but as lists were distributed and announcements of the individual 2-hour workshops were posted in the mailroom, 80% of the faculty attended at least one workshop, and 20% attended 3 or more. Interest and participation in the workshops evolved such that we had to offer multiple sessions of some workshops (e.g., web page design). Most of the workshops were scheduled for Saturday mornings.

The workshops were established on an invitation-to-participate basis. This meant that participation and products would vary according to participant ability and desire. No one end product was envisioned. A person might make one card of a Hyperstudio stack or 10 cards. People understood that they could come and listen, learn, and apply what they could without being evaluated.

The student experts prepared the workshop hand-outs and presented the material clearly. The authors attended all the sessions to support learning and to facilitate the discussion of educational and curriculum application. In this leadership situation *asymmetry of roles* was evident as the two types of experts, technology and pedagogy, conversed and learned from each other.

These were productive sessions as workshop participants, who understood the tremendous gains they could make, discussed the relevance and possibilities of technology as it related to teaching and research. People supported each other's learning, talking in dyads and group discussion, *acting as facilitators for the learning of others.* Student experts saw faculty supporting each other and worked with us similarly. It was a *cooperative system* with faculty members learning skills from students, and skilled student experts learning about pedagogy with the help of faculty. There was *continuous learning for all who were and are involved* as we devised and revised ways of teaching and researching with technology.

In this way people who might have seen themselves as on the periphery could attend a session, learn what they wanted to as *legitimate peripheral participants* (Lave and Wenger, 1991) then become part of the mainstream of technology learning.

There were a few signs of *culture shock*, for example, when a person expressed discomfort when one workshop was paced too fast for her sense of success. The biggest shock was during one session where faculty needed to get a particular access password in advance in order to log on to the computer lab network. Participants were told to go to the lab before the workshop to get a password. When we arrived at the workshop only one had obtained the needed password and could sign on to the system. Others had assumed that because they could log on in their office they would be able to do likewise in the lab. Most of that session was spent obtaining passwords, learning how to sign on, and accessing the lab network. It

was a vivid learning experience for everyone, somewhat frustrating, but a realistic example of what might occur when students are in the lab for the first time.

People need time to adjust to a new milieu. In the case where the attendee felt that it was too fast, one-on-one time was scheduled with one of the student experts to review the material at a more suitable pace. In the case of the workshop that was spent assigning passwords and accessing the network, the discussion focused on coping with and working through frustration and anxiety related to technology and how teachers adjust when equipment or procedures are not as they had planned. This illustrates *the instructional focus on process rather than products* of learning.

Returning to the notion of *acting as facilitators for the learning,* the three authors have further categorized (and sometimes caricatured) our roles within the faculty group. We each teach in a curriculum area and want to integrate technology into our work and the work of our students in a seamless and appropriate way. We bring complementary strengths to the process. Vi is the knowledgeable, listening, and enthusiastic leader and planner, Nancy is the supportive administrator (without a budget), Liz is often in the role of clown, adding lightness with humour when there was tension, asking hard and sometimes embarrassing questions. Vi asks, "What is the pedagogical foundation for this? Would something else work as well or better?" Nancy keeps things moving, saying, "I know how to get this started." Liz asks "Who benefits from this? Who is excluded? Which children might be disadvantaged

In addition to Rogoff's criteria we have identified what we call a "useful confusion" which supported our building a community of learners in a faculty of education. This useful confusion tolerates and validates a variety of definitions of expertise, a willingness to organize a wide range of learning experiences, including new ones where needed, and a willingness by those with great expertise to let those with less assume leadership functions where necessary. The useful confusion enhances our ability to work together co-operatively. However, as Rogoff suggests, *cooperative learning* does not imply smooth relationships; there are sometimes frustrations and in our case anger, when student experts could not get the access to memory and machines that were needed to prepare the workshops.

Invisible Work

We also were informed by past research which describes the "invisible work" of teacher education (Kapuscinski, Cooper, Krentz, Goulet, & Browne, 1997). Invisible work is the work which must be done to maintain a teacher education program and to ensure that it continues to develop. Invisible work includes conversation, collaboration, critique, and creativity. It is work which seldom receives visible recognition and so is not rewarded within the academic reward system.. It may even bring criticism because it takes time which might be spent doing activities which are better rewarded.

In the case of this project, none of the initiators have faculty inservice or technology education as part of their job description. We teach curriculum and foundations. We volunteered to do this together when we understood the need in light of our provincial and institutional context. Organising the technology workshops, talking to faculty about attending sessions, hiring the students, planning the workshop content and schedule were all aspects of added (invisible) responsibility. Added to this was the necessity of attending the workshops to give support to learning, solving problems as they arose and facilitating the discussion on pedagogy. It was very time consuming. Many of the workshops were on Saturday mornings because of conflicting schedules Monday to Friday. For these sessions we would serve home-made muffins and coffee. We wanted to instil a sense of community in tangible as well as interpersonal ways—a community of people who gather as friends will usually serve coffee and home-made baking. Food contributed to the sociocultural comfort of the sessions. This invisible work was important to carrying out the sessions and to creating the sense of community of learners around this challenging topic.

The technology workshop also involved invisible work as the authors mediated between their vision and the realities of where individual faculty members were in terms of technology knowledge. Much of what takes place in pursuing the vision is conversation, that is voice. We participated in countless conversations planning, clarifying, re-reading, scheduling and so on. These are necessary parts

of a successful program, but they are often invisible to the dominant reward system. We continue to do them because they make us more effective.

A Focus on Instruction

How to Use Technology Effectively

We have come to understand how important it is to focus on instruction rather than on technology when doing faculty inservice. Initially, this may seem strange, it is certainly counter-intuitive. However, faculty do not want to learn technology skills for its own sake, they want to learn them to teach better, to teach student teachers to teach better, to communicate with colleagues and students, to do research more effectively, and to present projects and findings more effectively. Technology tools are highly sophisticated and what is suited to one situation may well be unsuited in another. The ongoing discussion around potential uses and what else might work better, kept the conversation changing focus between the specific skill being learned and application in various teaching and research situations. We determined that if we were going to use technology it was not because it existed, but rather because it was a superior tool to the ones we already had, or that we could see the possibility of doing something better with technology than without it.

We were also working to determine what aspects of a particular application might enable faculty members to apply and integrate technology in new ways of teaching and learning. Technology can be used in a direct teaching mode to enhance that teaching style, it can also enhance the teaching style of instructors teaching according to constructivist learning theory, and most important for our context, technology can be a catalyst in transforming an instructor's teaching style from objectivist to constructivist (see Fulton, Couros and Maeers, SITE 2000 for more information about teaching styles and technology use).

Technology Anxiety and a Variety of Teaching Approaches

The workshop organisers were not worried about the ability of the faculty to learn new technology skills. As experienced learners, faculty members are accustomed to learning. They have sophisticated strategies for learning new skills and connecting them with previous ideas and knowledge. We realized that some faculty members might be anxious about embarking on this personal technology journey because the content was outside their area of comfort. Shiela Tobias (1978) faced this same 'problem' when she worked with content area anxiety. She took experienced adult learners in one field (e.g., English) and put them into a completely novel situation (e.g., physics) and observed them exhibit the same characteristics of anxiety that physics specialists have in a new environment for them. She then worked with this anxiety and turned it into strength by using effective teaching strategies.

The authors worked with the student experts to develop a variety of approaches to the new content and ideas to be presented. A workshop would usually begin with an overview of the learning goals using presentation software. Thus, the participants saw how to use technology as a *tool* to present ideas *about* technology. The workshops included photocopied handouts with space to write personal notes. These handouts contained visual images of exactly what they would see on the computer screen. There were frequent short periods of intense hands-on activity interspersed with debriefing sessions for questions, problems, and extension ideas. Throughout the workshops it was considered essential that the participants see technology being used in effective ways in presentations and in the hands-on activities. We anticipated that this modeling of effective uses of technology would enable the participants to consider effective ways they could use technology.

Looking back, we see that the authors chose a diffuse model of knowledge production in providing this inservice. While this could have led to problems which accompany invisibility in the corporate structure, it also provided the possibility of instructional and political strength when the inservice was successful and felt comfortable to the faculty who were learning.

Recommendations

For others wanting to do faculty inservice around technology and WWW resources, we would recommend considering the following:

- Invite faculty to participate.
- Offer individual consultation with anyone unsure of what they want to know about IT.
- Circulate a questionnaire to gather data about what is wanted and needed. This also provides data which might be needed to gain funding from administrators.
- Keep the learning relaxed; recognise that each person has a unique technology learning path.
- Emphasise the focus on IT for curriculum purposes—to enhance teaching and learning with and through technology.
- Plan short workshops to teach some basic IT skills and discuss some appropriate ways to use technology.
- Provide a variety of teaching approaches in the workshops to enable faculty members to see many uses of technology. Provide opportunities for debriefing of questions and problems and also for discussion on how to use technology appropriately in the classroom.
- Ensure that everyone receives a handout summarising the content.
- Offer one-on-one assistance following the workshop.
- Hire students to teach faculty. They are an inexpensive and a creative alternative to hiring consultants. At a reasonable hourly rate, students might spend a couple of hours working with each faculty member to assist in designing a web site for a particular course or searching the web for sites suitable to particular curriculum topics.
- Muffins—treat your colleagues as you would your best friends—especially if they're coming out on a Saturday morning to learn new content.

References

Kapuscinski, P., Cooper, E., Krentz, C., Goulet, L., & Browne, N. (1997). Program change in Teacher Education: Reflections on invisible work. In *Teacher Education--Theoretical Requirements and Professional Reality,* Volume 1, pp. 146-155.

Krauss, L. (1996). *Vygotsky in the Classroom.* New York, NY: Longman Publishers.

Lave, J., & Wenger, E. (1991). *Situated Learning Legitimate Peripheral Participation.* Cambridge, UK: Cambridge University Press.

Maeers, M., Cooper, E. & Browne, N. (1997). 60 in a 20 zone: Technology and teacher education. In N. Strudler, D. Neiderhauser & N. Hunt (Section Eds.), *Technology and Teacher Education Annual--1997,* pp. 1054-1057. Charlottesville, VA: AACE.

Maeers, M., Browne, N., & Cooper, E. (1999). Pedagogically appropriate integration of IT in an elementary preservice teacher education program. In J. D. Price, J. Willis, D. A. Willis, M. Jost, & S. Boger-Mehall (Eds.). *Society for Information Technology and Teacher Education Annual,* pp. 1157-1152. Charlottesville, VA: AACE.

Rogoff, B. (1994). Developing understanding of the idea of communities of learners. *Mind, Culture and Activity,* 1, 4, pp. 209-229.

Faculty Development: From Computer Skills to Technology Integration

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Abstract: Faculty development serves as an important precursor to technology integration. There are several strategies that have proven successful in effecting changes in the use of technology. One strategy is mentoring or one-on-one tutoring. A technology mentorship program was designed to provide staff development for the teacher education faculty of a small liberal arts college. The program uses elementary and secondary education majors who are not specialists in educational technology to assist faculty with technology skills. The program is directed by the educational technology specialist and a regular faculty member. The model consists of four major stages: large group planning sessions, small group technical sessions, one-on-one mentoring sessions, and a final large group session for sharing projects designed and implemented. Faculty that have chosen to participate in the technology program decided on a specific technology integration project to implement in their classes this semester.

Introduction

Preparing teachers to use technology is a major area of concern for teacher education. If preservice teacher education is to make a difference in how teachers use technology then teacher educators must model effective technology use.

According to the Office of Technology Assessment (OTA) report *Teachers and Technology* (1995) too few faculty are modeling instructional methods that integrate computer technology into teacher education courses. As indicated by Ingram (1994), the missing ingredient is a college and university teacher education faculty that is sufficiently technologically literate to accomplish these goals. In a recent national survey of teacher education institutions, the best predictor of graduates' use of technology in the classroom was the actual use of technology during college training (Moursund, 1999). Although many schools reported a formal, stand-alone course in educational technology as a notable feature of their program, this design did not correlate well with technology skills and the ability to integrate technology into teaching. On the basis of these findings the report suggested that educational technology instruction should be integrated into methods courses rather than being limited to a stand-alone course.

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Before faculty can model technology integration they must have the necessary technical skills. Faculty development serves as an important precursor to technology integration. There are several strategies that have proven successful in effecting changes in the use of technology. One strategy is mentoring or one-on-one tutoring. It has been used as a part of on going faculty development in both k-12 and higher educational settings.

Both Iowa State University (Thompson, Hanse, & Reinhart, 1996) and George Mason University (Sprague, Kopfman, & Dorsey, 1998) offer graduate courses in which instructional technology students mentor teacher education faculty in order to help the faculty members integrate technology into their teaching. Faculty in both programs report that the one-on-one approach was very effective in helping them increase their use of technology. Both projects began with a determination of faculty learning needs and goals, followed by one-on-one mentoring sessions with the graduate student and a faculty member. Thompson, Hansen, & Reinhart (1996) report the project forced the participants to devote time to learning technology. As a result of this required time the participating faculty members felt they made steady progress. Another strength of this project was the opportunity for the graduate students to address the specific needs of the faculty. In addition, Sprague, Kopfman & Dorsey (1998) report that participating faculty members enjoyed working one-on-one on their own computer where they felt more comfortable. The participating faculty members at George Mason University also reported that they felt they had made considerable progress in developing their technical skills.

On the basis of these models a technology mentorship program was designed to provide staff development for the teacher education faculty of a small liberal arts college (Milligan & Robinson, 1998). Unlike the Iowa State and George Mason University mentoring programs, this program used elementary and secondary education majors who were not specialists in educational technology. The program was directed by the educational technology specialist and a regular faculty member. Key elements of the technology mentorship program included one-on-one relationships between faculty and staff, the training of student mentors in mentoring techniques, communication with the program director in the form of meetings and e-mail journals, and a formal commitment for both faculty and students.

Model Description

The ISTE standards for preservice teachers were used to gauge the progress of faculty that participated in the original program. These standards include goals in three major areas: basic knowledge of computer operations and concepts, personal and professional use of technology, and integration of technology in instruction. During the first two years of the technology mentorship program the faculty developed skills in the first two areas of these goals. At the present time the technology mentorship program has been revised to focus on the third major area of the ISTE goals: integration of technology into instruction.

The new model consists of four major stages: large group planning sessions, small group technical sessions, one-on-one mentoring sessions, and a final large group session for sharing projects designed and implemented.

The key elements of the new mentorship program are similar to the previous model. As before, the one-on-one mentoring relationship is the primary feature of the model. In addition there are formal commitments for both faculty and students. Faculty commitments include time spent with mentors as well as time spent working on skills and projects between sessions, sharing their projects with other faculty, and participating in an evaluative interview at the end of the semester. For the students the formal commitment is in the form of a one-hour course. Course requirements include planning and implementing large and small group sessions. This will be part of the 35 hours of participation required. Other hours will be spent preparing for, and meeting in, one-on-one sessions with the faculty, developing their own technology skills, and attending mentor meetings throughout the semester. Mentors will provide updates between meetings through e-mail journals Description of the four stages of the model follows.

Large Group Planning Sessions

There were three large group planning sessions. The program directors led the first session with an overview of the way technology has been used in instruction in the past, and a description of the new technology mentorship model. Emphasis was placed on the relationship between pedagogical beliefs and practices, and technology. The following ideas were presented for faculty consideration. Teaching with technology means we must think about both pedagogy and technical skills. Historically, technology has been used as a way to deliver instruction, as an aid to teaching, to enhance what the teacher is doing already. However, we propose another way to use technology, as it is used everyday in society, as a tool. We can use technology as a tool to challenge our beliefs about teaching and learning. Do we deliver information to students or help our students construct knowledge? Do we tell students what to do or do we facilitate their own ways of working and learning? It is time to make a decision about the way in which you will use technology in your teaching: to enhance what you already do, or to challenge you to do something different? As you focus on your pedagogical beliefs and goals you will develop the technical skills to support them.

The student mentors were the leaders of the second session because the primary purpose of that session was to inform the faculty of the abilities of their students. The mentors presented their own projects from the educational technology class that all education majors are required to take and from other educational technology courses and experiences. One technology mentor shared her web-based instruction on file management that she had created as a technology mentor during a previous semester. Others presented activities and lessons using spreadsheets, databases, HyperStudio, and PowerPoint. They also shared the departmental web page and the syllabus from the educational technology class, focusing on Internet sites for professional resources and organizations.

The final session focused on what other programs and institutions are doing to integrate technology into teaching. In addition to the review of the literature discussed earlier in this article, the project directors shared specific ideas from a variety of educational disciplines, including student assignments as well as faculty presentations. After this session, faculty were asked to consider a single course in which they wanted to

integrate technology. Planning sheets were provided to assist them in deciding what integration projects might be possible for them. The planning document included questions regarding the course in which they would use technology, ideas for use in instruction, ideas for use in student assignments, the software or technology they might use, and any additional needs they would have to implement their project. Faculty that chose to participate in the technology program decided on a specific technology integration project to undertake this semester.

Small Group Sessions

On the basis of the planning documents that were turned in by the faculty, three small groups were formed. The mentors led sessions for each small group. One mentor developed a session on using Netscape Composer, one mentor led two sessions on Internet searching skills, and another mentor worked with the faculty who wanted to learn PowerPoint.

Mentoring

Following the small group sessions, the mentors began working individually with faculty on their projects. Three faculty have chosen to develop web pages and put course syllabi and other teaching materials online. Three other faculty members have chosen to work with PowerPoint and develop electronic presentations for their courses. One faculty member has decided to learn about moderating listservs and will set up a listserv for a regional professional organization.

Project Sharing

We are currently planning the process by which faculty members will share their project with the department. This may be in a large group session or via special web pages. Evaluation of the program will be conducted using student journals, program director journals, and faculty and student interviews.

Conclusions

As you will see in the words of the students, they have started the program with enthusiasm. "We have some great opportunities in front of us. I am very excited about this." They are already experiencing the benefits of sharing knowledge and learning about teaching. "I was extremely nervous about this presentation. I couldn't sleep the night before. It was the most nervous, I have ever been, but then it was the least. It's hard to explain – I think the fact that because I'm so comfortable with using technology helped me get through this presentation. I realized that I was there to provide information of which the faculty didn't have knowledge. That gave me a confidence I don't think I've ever experienced before." Most importantly students and faculty are building

relationships from which they all will grow. "The part most beneficial to me is the relationships that are forming. In that area I am very pleased and learning a great deal. I knew that I was gong to enjoy doing this, but it has gone beyond my expectations. That is very good." Professional development is ongoing, and it is going on here with this mentorship program to integrate technology into instruction.

References

Ingram, J.K. (1994). A model curriculum to promote teacher-centered use of technology. *Peabody Journal of Education, 64* (4), 113-130.

Milligan, K.L., & Robinson, S. O. (1998). Technology mentorship: A model for faculty development. *Technology and Teacher Education Annual.* Charlottesville, VA: Association for the Advancement of Computing in Education.

Moursund, D. (1999). *Will new teachers be prepared to teach in a digital age?: A national survey on information technology in teacher education.* Santa Monica, CA: Milken Exchange on Educational Technology.

Office of Technology Assessment, U.S.C. (1995). *Teachers and technology: Making the connection* (OTA-HER-616). Washington, DC: U.S. Government Printing Office.

Sprague, D., Kopfman, K., & Dorsey, S. L. (1998). Faculty development in the integration of technology in teacher education courses. *Journal of Computing in Teacher Education, 14*(2), 24-28.

Thompson, A., Hanse, D., & Reinhart, P. (1996). One-on-one technology mentoring for teacher education faculty: Case study reports. *Technology and Teacher Education Annual.* Charlottesville, VA: Association for the Advancement of Computing in Education.

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TECHNOLOGY MENTORSHIPS IN HIGHER EDUCATION: AN OPTIMAL MATCH FOR EXPANDING EDUCATIONAL COMPUTING SKILLS

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Abstract: Mentoring relationships to invite higher education faculty to learn educational computing skills on a one-to-one basis are an "optimal match". An optimal match involves a carefully constructed personal learning experience accommodating the inevitable differences in learning. An appropriate match builds connection with the circumstances that learners encounter and the schemata that they assimilate into their professional repertoire. Faculty technology mentorships build trust between participating individuals in order to implement new skills in non-threatening, meaningful ways to build personal knowledge and skills, to integrate new learning in a professional context, and to reflect on the learning process. Results from a specific technology mentoring experience are described in this paper including the perspective of both the mentor and the mentee.

Lack of University Education Faculty Leadership in Technology

An inadequate number of teacher education programs have faculty who are modeling instructional methods that integrate computer technology (Handler & Marshall, 1992; Office of Technology Assessment, 1995). Teacher training programs must recognize the need for training in technology, taught either in a specific class or across the curriculum. While scholars have advocated integrating technology in both methods and foundation courses (Berger & Carlson, 1988; Billings & Moursund, 1988; Bitter & Yohe, 1989) coursework needs to be redesigned to integrate technology in in relevant contexts. Computer technology should facilitate content learning from carefully designed course goals and objectives which, then, can be developed using appropriate technology-based activities and practices (Todd, 1993).

New teachers learn to teach the curriculum using the technology they have already learned or have seen modeled in their college classrooms. Without faculty role models to observe in methods courses, preservice teachers are deprived of opportunities to witness models for teaching with computers (Bruder, 1989; Fulton, 1989, Beisser, et. al., 1997). According to Wetzel (1993), most college professors simply do not use it, in spite of adopted competencies that education majors should learn how to use computer productivity tools for effective instruction, and how to demonstrate those abilities.

The International Society for Technology in Education (ISTE) and the National Council for Accreditation for Teachers (NCATE) have established Foundation Standards requiring competencies to use and to evaluate computers and related technologies. Learners must operate software, multimedia and hypermedia, and telecommunications to support instruction. They must demonstrate skills in productivity tools for personal and professional use, understand equity, ethical, legal, and human issues related to technology; and stay current in educational applications of computers and related technologies. Despite ISTE/NCATE Standards first initiated in 1991, many universities have not adhered to these guidelines nor have they taken leadership role in this movement (Wilson, 1995).

This poor response to technology may be influenced by the fact that many college of education faculty, themselves, lack requisite skills or experience to model teaching techniques using computers in their areas of expertise. Therefore, it is necessary for them to receive personal assistance in learning how to use computers, as well as implementation of computer technology in their respective courses. Using graduate students to mentor college of education faculty has been shown to be an effective technique for integrating technology into the course work of preservice teachers (Brewer, 1995; DeWert & Cory, 1996; Thompson, Hanson, & Reinhart, 1996; Thompson & Schmidt, 1994; Zachariades, Jensen, & Thompson, 1995; Zachariades & Roberts, 1995, Beisser, Kurth, & Reinhart, 1997).

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Background

A technology mentorship program developed at Iowa State University involves a one-to-one experience inviting faculty members to work with graduate student mentors as part of a long term department effort to improve faculty competencies and confidence (Thompson & Schmidt, 1994). Although mentorships last one semester, educators need much more time to fully implement goals and objectives using technology in the instructional process. Experienced computer-using teachers require five to six years to develop a framework for effective use of technology in teaching (Sheingold & Hadley, 1990). The paired mentoring experiences helps university faculty to learn and reinforce skills. University faculty members who volunteer for this semester-long experience are encouraged to introduce technology into their respective courses in a meaningful context.

A mentorship match begins with pairs of students and faculty assigned to work together. The mentorship involves weekly meetings and an established agenda. Crucial to the task, is the successful pairing of individuals willing interact regularly in order to develop technology skills and experiences in teacher education. Pairing should be an "optimal match" (Hunt, 1961), whereby both mentor and mentee are willing to engage in carefully constructed personal learning experiences reflecting the inevitable substantial differences in rates of learning. The appropriate technology-driven circumstances encountered by the mentee and mentor should match the schemata of the faculty member. The experiences assimilated into their professional repertoire must build trust between the two individuals in order to implement new technology skills in a non-threatening, meaningful way. The goal of the mentorship is to provide personal knowledge and skills, to integrate new learning in a professional context, and to reflect on the learning process.

Key Factors in an Developing an Optimal Match

Learning is a sequential, developmental process. The development of skills, understanding in domains of knowledge, and strategies for solving problems are acquired gradually in sequences that are more or less predictable (Hilgard & Bower, 1974). Effective teaching involves a sensitive assessment of the individual's status in the learning process, as well as a presentation of problems that slightly exceed the level already mastered. Tasks must be neither too-easy nor too-difficult to understand. Hunt (1961) describes this as the "problem of the match" which is based on the principle that learning occurs only when there is "an appropriate match between the circumstances that the learner encounters and the schemata already assimilated into his repertoire." In other words, "teaching must start where the learner is (Hunt, 1961, p. 268)." The pace of educational programs must be adapted to the capacities and knowledge of individuals (Robinson, 1983). Mentorships provide an opportunity for starting with the learner's experience and for progressing to exceedingly higher levels of complexity.

Elements of "joy" must be a part of an optimal learning match. Engaging, collaborative, complex, intellectually invigorating learning situations reflect elements of joy in order to sustain efforts (Csikszentmihalyi, 1990). Mentorships allow learners to confront tasks they need and want to complete together. A successful mentor pair must concentrate on mutually-determined regularly scheduled activities. The pair may establish clear goals for the tasks before and during each mentorship session or may freely explore ideas that emerge into an agenda. The intimacy of a private mentor learning experience allows immediate feedback through internalized criteria, trial and error, or explicit responses. They act with a deep yet effortless involvement, removing awareness of other worries and frustrations of everyday life. Both members exercise a sense of control over their actions. The concern for the self disappears, yet paradoxically, each member experiences a stronger emerging sense of self after the experience is over. For example, a scheduled hour of time seems to pass by in minutes (Csikszentmihalyi, 1990).

Mentorships, as an optimal match, account for the needs of the learner. Such a mentoring pairing program may facilitate the development of basic technological competencies, implementation of technology in college course goals and objectives, and reflection of the mentoring process. However, the success of any mentoring relationship is dependent upon several key factors. A successful mentor relationship is dependent upon a developmental, multidimensional relationship (Clemson, 1987). "Spontaneity and personal fit" invites mutual choice for mentor pairs to work together (Clemson, 1987, p. 86). Both participants in a mentoring program should have the freedom to choose one another. Both the mentor and protégé should benefit from the relationship (Clemson, 1985). Mutual respect and trust (MacArthur, et. al., 1995; Clemson, 1987) and mutual participation (Kay, 1990) are key factors. Open dialogue between mentor and protégé allow each participant to express their feelings, talents, knowledge and expectations (Gehrke, 1988). The more success factors present in a mentoring relationship, the more beneficial the relationship will be to each of the participants.

The Mentorship Experience

Carol M., an Iowa State University reading language arts instructor, volunteered for the semester mentoring experience. Her background included no formal training in technology, little experience using computers in personal or professional work, therefore utilizing the computer primarily as a word-processing tool. Her college teaching experiences included work in a small private college without much technical support or encouragement for using technology in teacher education. At a Midwestern public university she now has exposure to skilled faculty peers and eagerly sought a mentorship experience during her first semester. The following excerpts were from reflective journals maintained throughout the semester.

The Mentee's Perspective: Building Personal Knowledge and Skills

"On the first day, we made sure my e mail was operating and set up my e mail address book. I made a file folder called 'Sally' for communication with my mentor. We labeled [Eudora Pro 3.1.1®] icons and changed them to labeled words. We switched them from the horizontal to vertical and reduced the size to be more accessible and practical. I also learned what they meant. Some I had known before this, but not all. I wanted all of my college classes to be on e-mail. I didn't know how to do that. I was thrilled today when I was able to send all my class an e mail without highlighting each name separately. Sally had left a great message that enabled me to highlight by holding down the shift key. Hurrah!

We started Power Point®. My assignment for next time was to do several slides that I could actually use in class. Sally said she would show me how to "take them on the road" electronically. I am excited about this new aspect of computer technology application!

I felt very good as yesterday I accessed Power Point and started a presentation. I used the automatic method but still have a number of questions such as: How do I get to see what I've done? How do I change backgrounds? I am anxious meet with Sally today! I was very excited today when I was able to figure out how to add slides, pictures and text to those slides in Power Point®. I changed my printer port to a new printer, conveniently located in our office, and it worked! Sally left great instructions on how to do that. She also left me a message on how to access my class list and send a group e mail.

So funny! Today I couldn't even remember what the shift key was called! The brain functions differently under pressure, especially when you feel inadequate about the content area - it doesn't work even with things that you know! When I struggled for the word, Sally whispered the word "shift key" to me. This was real HELP!

I am now up and running with e mail to my classes. I have sent several whole class messages and a number of students are corresponding urgent needs via e mail that could not have been taken care of otherwise. (This is using the media as it is intended - I love it! Real individualized attention too).

Next I learned about borders and shading, finding files, labeling disks, justification, alignment, and page preview. We started on templates, but will finish next time. Between now and then I will make sure I have the format just right for what I want made into a template. I usually hand out a paper to be filled in and handed back. Using a template will save paper and time. I will ask that the students access it and return the completed assignment through e mail. No paper should be used . I will tinker with what I learned today.

My computer monitor quit today. After I had tried to re-start it, I asked my office mate for help. She couldn't diagnose the problem, so we called Lance, the technical specialist. Meantime she taught me the "paper clip trick," a "trick of the trade" to get my disk out of the computer. She bent a paper clip and inserted the straight end into the small hole just beneath the disk hole. The disk jumped right out! Hurrah! Lance responded within 15 minutes to my phone message. He determined that my monitor had died. He said not to worry as it was an old one and it happens. He went right down and got me another one and it was up and running immediately. What service! I was so relieved that I had not 'killed it.' Such thoughts promote computer phobia!"

Integrating new learning in a professional context

"Today was 'D' day because I decided to use Power Point in class. It was my first time using it to produce and present a lesson. In a relatively "safe" environment, I was able to think on my feet, process the steps to hook up the technology, and take it down while I was lecturing and interacting with my students. It went very well and I was amazed that I actually could do all of that at the same time.

I checked out the LCD panel, took the laptop, and went out into the real world ALONE! I went to my empty classroom before class and carefully set up everything by myself. I let the class know that this felt similar to their reading/language arts practicum. I, too, had butterflies and fear that things might not work. They asked me to

go back to one of the slides and I never had done that before, so I just pushed the back arrow and it worked! Yes! Problem solving is always a big deal when under pressure. I honestly felt that I could have used regular overheads with the same effect without all the hassle of toting heavy, very expensive equipment in a room so dark.

Fun time with Sally! I was able to make my Power Point scroll or change slides using various styles and rates. It was so simple and I think it really improves the presentation by making it a bit unpredictable (nobody goes to sleep). I will enjoy trying it in my class. I was reminded how to get rid of files, folders etc.

I also learned about a program called 'Inspiration®'. I am so excited about it as it goes right along with webbing and mapping that I am doing in my classes. It is a real graphic organizer that will certainly help us with our work. Once I am familiar with it and feel "safe" I will reserve a computer lab to show my students. I accessed theme units through the Internet search engine Alta Vista. I printed several pages and made overheads of them so that I could show my two classes what was already done on themes. For beginners it would help to have such an organizer. Some students already were very literate about this [Alta Vista], but most were not and were encouraged and thought it helpful.

What a riot! Neither Sally or I could find how to shut off my computer. Even after we called the computer guru's office they only could say, pull the plug! I had to get on my stomach on the floor to get at the plug. I like Sally's ability to say 'I don't know' and then seek to find a way or ask someone."

Reflecting on the learning process

"I decided today that there wasn't as much carry-over into the real world of useable technology as I'd hoped. I was beginning to feel frustrated again. I am going to keep a little notebook next to me when Sally is teaching me, so that I can write down exactly what steps were taken to produce the needed effect/product/site, date them and then try the steps when Sally isn't there.

I have concentrated on the goal of learning IN MY WAY. I learn best visually, then write ideas down and try it from my notes. Under pressure I really "down-shift." It takes me MUCH longer to learn (if I really ever do!). Most of the time I just muddle my way through it and then finally somehow get an end result , but have no idea how to replicate it. I am always just glad to be done and not to have looked like an absolute fool."

Reflections of the computer technology mentorship

"I am not intimidated by the computer any more. I no longer feel I might ruin the computer, nor am I afraid I will break something. I was worried I would display my ignorance to humanity. I felt the consequences of not knowing were great...especially in the eyes of others--I felt I was losing information in the fast-growing educational technology field at an alarming rate. The mentorship provided instruction and interpretation in a meaningful way. This mentorship helped to bridge the gap. The mentorship was a match for my learning style. I was able to take risks and pursue new ideas. This is very important. Sally was able to adapt to my learning style and make technology important to me. In the absence of threat, I was able to reduce to a low level of stress and engage in new learning that was of benefit to my teaching immediately!

The purpose of a mentorship is to scaffold-to build meaningful experience (Vygotsky, 1933). I liked Sally's role as mentor. She operated under, ' I'll be there for you...Your level of progress is your own. Your rate of learning is OK...I have no expectations for you!'

I needed new skills in small increments. I needed time to process those skills. I needed hands-on experiences. I don't do well with "tell me." I'll lose it otherwise. The regularly scheduled weekly hour was perfect. I knew this was my time to ask questions, to bring my concerns to Sally. It didn't encroach on faculty time. We agreed on "our time" together. There was a starting and ending time. This was a safe environment.

In summary, I've learned that just a little information to open up a vista of opportunities. There was so much I didn't know. It has been a great rapport builder with my students! They have thanked me for the personal attention I have learned the power of Power Point®. I imagined uses and can now explore new uses for meaningful, interactive presentations in class. It added 'class' to my presentations. It has given me vocabulary and new language. Knowledge is power! You hear so many computer terms thrown around...file, folder, attachments, disk, server, upload, download, etc. I can not only name but now use technology terms. I learned in privacy, not in a class or a workshop. We had a chance to talk and to relate this to my personal and professional needs."

The Mentor's Perspective: Building Personal Knowledge and Skills

"Our mentorship began by establishing 'spontaneity and personal fit.' This was a mutual choice for us to work together as mentor pairs (Clemson, 1987). I provided Carol with the freedom to ask any question, figure things out on her own, and establish new skills with technology in her teaching and communication.

Indeed, she has learned new skills in technology. In summary, she has learned specific functions of e mail, word processing programs, files and folders, and management of information on disks and the hard drive. She learned about Power Point® software within the context of presenting content, not as a substitute for overhead transparencies. She practiced using a laptop and LCD panel to present her program to various audiences.

Using Inspiration 4.0® software for brainstorming, she increased the skillfulness of her students using graphic organizers. She searched the Internet for information, bookmarked valuable websites, ordered books from http://www. amazon.com, and learned about technical terms. She was introduced to Hyperstudio® as an authoring tool and has not only begun to experiment with it, but has a useful purpose to create a stack of book sharing slides from each of her students. Last but not least, she learned how to turn off her computer by crawling under her desk.

Clearly, her reflective journaling describes not just what she learned, but the ways in which she learned. I see that she is figuring out solutions to problems on her own."

Integrating new learning in a professional context

"In the process of learning new skills, Carol acknowledged that autonomy and self-reliance were powerful learning tools. Her journaling gradually progressed from episodes of needing help, asking for assistance, and calling the department experts to making attempts to solve problems herself. She began using more specific technology vocabulary and credited herself with learning and using skills.

An "optimal match" is based on the principle that learning occurs when there is an appropriate match between the circumstances that the learner encounters and the schemata already assimilated into his repertoire (Hunt, 1961). Beginning with conversations about her experiences and needs in using computer technology in teaching and learning, we began with her level of interest and progressed gradually to exceedingly higher levels of complexity. The pace of Carol's technology mentorship was adapted to her capacity and knowledge. (Robinson, 1983).

Carol did not learn skills in isolation. To learn Power Point®, she compared Vygotsky and Piaget to illustrate methods of teaching reading. To learn Internet search skills, she found thematic units and ordered literature online. To communicate with her students, she used e mail, word processing, and various software programs."

Reflecting on the learning process

"Hawkridge (1983) summarizes that schools primarily adopt technology for *social* and *vocational* purposes to be sure learners are aware and unafraid of using technology. They know students should understand computers and their role in society. They want students to implement technical skills for employment in the twenty-first century. While Carol began the mentorship semester with social and vocational goals in order to overcome a perceived lack of skills, she finished the semester, using technology skills as teaching tools to influence the quality of learning in her classroom.

Hawkridge (1983) states that few schools implement technology with a *pedagogical rationale* in an effort to understand that there are known advantages to using computers in learning as compared to traditional methods. Fewer still use technology with *catalytic rationale* hoping to reform teaching practices or to make desired changes in student learning.

Carol's final product, a Technology How-To Notebook, archived her new technology skills and interesting ideas from our mentor experience. She has entered process steps in order to help her remember what she has accomplished. Next, she noted an application of each new skill to her Reading/Language Arts teaching and learning. Entries are dated in the order that she learned them during our mentoring sessions. They are for her, 'real life' experiences that fit her schemata of learning in an optimal learning match."

Conclusions

In reality many teacher preparation programs do not have sufficient faculty support in order to use technology in teacher education preparation. Encouraging teacher education faculty to use technology in teaching and learning is possible using effective mentoring as an optimal match to increase technological competencies. One-to one mentorships can provide cost-effective, personally-rewarding experiences for faculty with motivation and freedom

to progress at their own pace. A mentorship team can explore and investigate responses to individual technological needs, address challenges of complex and open-ended problems, and rely on inquiry and invention.

As Harrington (1991) suggests, there is a difference between preparing teachers to use technology and using technology to prepare teachers. If we only prepare teachers to use technology, we limit the conception of the role of technology in education. University-level education faculty must be empowered to take more responsibility for both acquiring technological competencies in order to improve the capabilities of their preservice students.

References:

Beisser, S.R., Kurth, J.L. & Reinhart, P. (1997 conference proceedings). The teacher as learner: An undergraduate student and faculty mentorship success. *SITE-Society for Information Technology and Teacher Education International Conference*, Orlando, FL.

Berger , C. F. & Carlson, E. A. (1988). A model for incorporating learning theories into preservice computer training. *Outlook: A Publication of the Special Interest Group on Computer Uses in Education, Association for Computing Machinery,* 20(1), 32-46.

Billings, K. & Moursund, D. (1988). Computers in education: An historical perspective. *Outlook: A Publication of the Special Interest Group on Computer Uses in Education, Association for Computing Machinery, 20*(1), 13-24.

Bitter, G. G. & Yohe, R. L. (1989). Preparing teachers for the information age. *Educational Technology, 29*(3), 7-11.

Brewer, S. M. (1995). *Infusing technology into the preservice teacher education curriculum: Four case studies in mentoring of university faculty by practitioner graduate students.* Unpublished doctoral dissertation, University of Central Florida.

Bruder, I. (1989). Future teachers: Are they prepared? *Electronic Learning,* January/February, 33-39.

Clemson, R.L. (1985). The dynamics of mentoring in higher education: Experience of department chairs. Unpublished doctoral dissertation, University of Maryland.

Clemson, R. L. (1987). Mentorship in teaching. *Action in Teacher Education,* 9(3), 85-90.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* New York: HarperCollins Publishers.

DeWert, M. H. & Cory, S. L. (1995). Becoming partners-Building a school/university collaboration focused on teaching and learning with technology. *Journal of Educational Computing, 12*(3), 8-12.

Eudora Pro 3.1.1®

Fulton, K. (1989). Technology training for teachers: A federal perspective. *Educational Technology,* 29(3), 12-17.

Gehrke, N. J. (1988). On preserving the essence of mentoring as one form of teacher leadership. *Journal of Teacher Education,* 39(1), 43-45.

Handler, M. & Marshall, D. (1992). Preparing new teachers to use technology: One set of perceptions. In R. Carey, D. Carey, J. Willis & D. Willis (Eds.), *Technology and Teacher Education Annual, 1992,* (pp. 386-388). Charlottesville, VA: Association for the Advancement of Computing in Education.

Hawkridge, D. G. (1983). *New information technology in education.* London: Croom Helm.

Harrington, H. (1991). Normal style technology in teacher education: Technology and the education of teachers. *Computers in the Schools, 8*(1/2/3), 49-57.

Hilgard, E.R. & Bower, G.H. (1974). *Theories of learning.* 4th ed. Englewood Cliffs, NJ: Prentice-Hall.

Hunt, J.M. (1961). *Intelligence and experience.* New York: Ronald Press.

HyperStudio® 3.1 [Computer Software]. El Cajon, CA: Roger Wagner Publishing.

Inspiration® 4.0 [Computer Software]. Portland, OR: Inspiration Software, Inc.

Kay, R. S. (1990). A definition for developing self-reliance. In T. M. Bey & C. T. Holmes (Eds.), *Mentoring: Developing successful new teachers* (pp. 25-37). Reston, VA: Association of Teacher Educators.

MacArthur, C. A., Pilato, V., Kercher, M., Peterson, D., Malouf, D., & Jamison, P. (1995). Mentoring: An approach to technology education for teachers. *Journal of Research on Computing in Education,* 28(1), 46-62.

Microsoft PowerPoint® 4.0 [Computer Software]. Redmond,WA: Microsoft Corporation.

Microsoft Word® 6.0.1 [Computer Software]. Redmond, WA: Microsoft Corporation.

Robinson, H. B. (1983). A case for radical acceleration: Programs of the Johns Hopkins University and the University of Washington. In C.P. Benbow & J. C. Stanley (Eds.), *Academic Precocity,* (pp. 139-159). Baltimore: The Johns Hopkins University Press.

Sheingold, K. & Hadley, M. (1990). *Accomplished teachers: Integrating computers into classroom practice.* New York: Center for Technology in Education, Bank Street College of Education.

Thompson, A., Hanson, D., & Reinhart, P. (1996). A college departmental technology diffusion project. In B. Robin, J. D. Price, J. Willis & D. Willis (Eds.), *Technology and Teacher Education Annual, 1996,* (pp. 495-498). Charlottesville, VA: Association for the Advancement of Computing in Education.

Thompson, A. & Schmidt, D. (1994). A three year plan to infuse technology throughout a teacher education program: Year 3 update. In J. Willis, B. Robin & D. Willis (Eds.), *Technology and Teacher Education Annual, 1994,* (pp. 46-51). Charlottesville, VA: Association for the Advancement of Computing in Education

Todd, N. (1993). Curriculum model for integrating technology in teacher education courses. *Journal of Computing in Teacher Education, 9*(3), 119-125

U.S. Congress, Office of Technology Assessment. (1995).*Teachers and technology: Making the connection.* (Report No. OTA-EHR-616). Washington D.C.: U.S. Government Printing Office.

Vygotsky, L.S. (1933). In L.C. Moll, (Ed.) *Vygotsky and education: Instructional implications and applications sociohistorical psychology.* New York: Cambridge Press.

Wetzel, K. (1993). Models for achieving computer competencies in preservice education. *Journal of Computing in Educational Technology,* 9(4), 4-6.

Wilson, C. T. (1995). Issues in instructional design related to computer technology implementation in the classroom. *Delta Kappa Gamma Bulletin,* 61(3), 5-9.

Zachariades, E. H., Jensen, S. J., & Thompson, A. (1995). One-to-one collaboration with a teacher educator: An approach to integrate technology in teacher education. *Journal of Computing in Teacher Education, 12*(1), 11-14.

Zachariades, I. & Roberts, S.K. (1995). A collaborative approach to helping teacher education faculty model technology integration in their courses: An informal case. *Journal of Technology and Teacher Education,* 3(4), 351-357.

Constructivistic Learning: Also for Faculty!

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Abstract: The Amsterdam Faculty of Education is developing and implementing a new curriculum concept for professional education, for which it attained the status of "the experimental teacher education in the Netherlands" in 1997. This concept, fitting in the constructivistic learning paradigm, is nicknamed 'learning through producing'. The concept does not only yield a vision on learning processes, but also an implementation strategy. By basing the professional development of the Faculty of the Institution on the same constructivistic principles one induces a transformation of both the curriculum and the organization. The result of this transformation should prepare both students and Faculty for the information age. ICT plays a role as catalyst in this complex transformation.

Introduction

This short paper will focus on the implementation strategy towards Faculty members and the Institution. The professional development on these levels uses the mirror principle of congruence: use the same concept of learning and education as the one you use for students.

Quality care in an institution is dependent on the way one succeeds in arranging learning processes for Faculty and Organization. Lifelong Learning is not only the future of a student, also the Institution must show the skill to keep developing itself using learning goals en learning action plans. At EFA we use the metaphor of "The Expedition" for this way of life in the Institution.

The mirror effect of congruence concerns the following central elements of the educational concept:
- constructivism (learning through producing; authentic learning tasks, resources of knowledge and skills)
- learning cycles: orientation, planning, execution and evaluation
- responsibility for one's own learning processes (integrative assessment, digital portfolio system)

The effect is also connected to some corollary elements:
- the teacher as coach
- collaborative learning
- information and communication technology

An extensive presentation of these basic ideas can be read in the SITE 2000 paper "Proving Competence: Integrative Assessment and Web-based Portfolio System in a Dynamic Curriculum", by Douwe Wielenga. We will not repeat that information here, but for the figure on the next page.

The mirror

We see the improvements in the quality of the programs' components as a learning process of the Amsterdam Faculty of Education itself, both on the level of the teacher educators and on the level of the institution. This makes it possible to mirror the model, concepts and facilities we use to facilitate the learning processes of the students on the learning processes of teacher educators and the institution!

We see the professional development of teacher educators as a continuous learning process, which follows the same phases as the learning cycle of the students. See figure 1 on the next page.

We are in the process of collaboratively describing the professional competencies that teacher educators need in the new concept of curriculum, we are using the same portfolio system for teacher educators that our students use, and we are thinking about possibilities to organize integrative moments of assessment where teacher edu-

cators have to show to their peers their growth on the desired competencies. In the last two years the development of new learning practices is already organized in a way that is *both* a process of development of new learning environments and learning materials *and* a learning process of the teacher educators that carry out this development. In this learning process experts are coaching Faculty on new learning technologies and peers are assisting them in formulating learning goals connected to their innovative productive work and connected to the desired competencies.

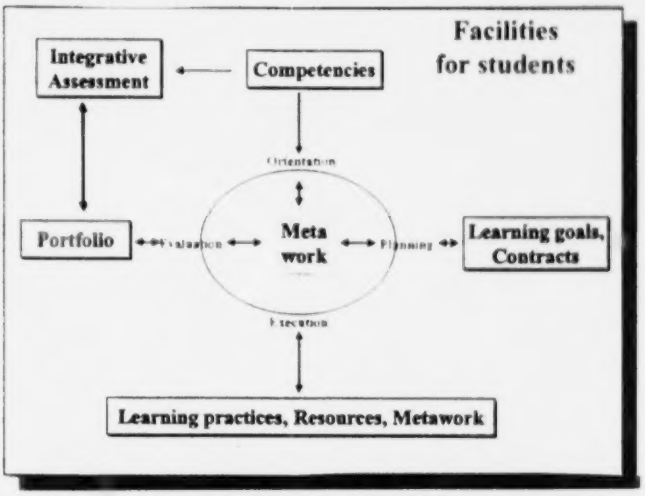

Figure 1: program facilities in a dynamic curriculum

The same model can be used on the level of the institution. The expedition towards a more dynamic curriculum must be seen as a learning process. We have defined our learning goals as the main aims of the project. We use a portfolio to keep record of the development within the Faculty, of the results and experiences, and to prove our growth to the outside world. This portfolio registers products, reflections, and comments from people outside EFA. These reflections are often based on action research by Faculty and by academic research that is carried out by independent research institutions, commissioned by EFA.
The management of EFA is coached by a group of experts on education and ICT, and we plan to organize external audits, which will act as integrative moments of assessment.
In this way both the institution as a whole and the teacher educators individually will have to act as role models for the students.

Examples

During the SITE 2000 session the congruence on learning concepts will be shown using two examples of constructivistic learning by Faculty:

1.

The first example concerns an expertise center for curriculum development, where Faculty, relieved of their teaching duties, work on a specific curriculum development project and, at the same time, through this work acquire new knowledge and skills. As part of their development assignment Faculty heighten their expertise on subjects like the design of digital learning environments, self directed education, or collaborative learning. In this process another person is coaching them. This approach must result in a significant reduction of resistance to change. In the presentation we will show the details of this learning process and the dilemma's that we encounter.

2.

A second example is about the professional development of those members of Faculty who are responsible for the implementation of a brand new system of integrative competence assessment of students at the Amsterdam Faculty of Education. These persons develop their knowledge and skills in this area by producing innovative materials for assessment. Following questions that arise hereby they start research, consult experts or take part in demand driven training sessions that they think they need for their development work.

Information in the English language on the expedition of the Amsterdam Faculty of Education can be seen at the Publications part of the home site of EFA: http://www.efa.nl

Building a Vision for Technology Integration

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Abstract: Students have few opportunities to observe faculty using technology in courses and more rarely use a wide range of technologies in the classroom. This report examined data gathered to determine the state of faculty technology use for teaching and learning. Expectations of faculty for students to use technology, barriers and possible solutions to achieving technology integration in teaching and learning were examined. Three goals for further development of technology integration were established. 1) Preservice teacher education courses will be redesigned to reflect best practice and include the infusion of appropriate technology throughout. 2) Faculty will have the training they need to successfully integrate technology into their courses. 3) Students will have experiences that enable them to demonstrate effective and appropriate use of technology based on ISTE/NCATE standards. A plan was developed to build a vision for technology integration. Strategies for faculty development and program development were identified and implemented.

Introduction

The State of Alaska has been improving education through its Quality School Initiative. As part of this initiative, teacher education standards were developed and adopted as regulation (AK DOE, 1997). In September 1998, the State Board of Education adopted the National Council for Accreditation of Teacher Education (NCATE) standards and entered into a state partnership with NCATE. UAA is participating in the transition plan leading to required NCATE accreditation for approval of all Alaska teacher preparation programs by 2002. The University of Alaska Anchorage School of Education is reviewing and revising its teacher education program to meet these standards.

The University of Alaska Anchorage (UAA) is one of three state universities in Alaska. The University of Alaska system is aware of the importance of technology support for education. UAA implemented a system wide technology initiative and invested resources into developing an infrastructure of modern information technology that includes hardware, software, and training. The School of Education (SOE) continually upgrades its technology. All faculty offices and all computers in the SOE computer lab are networked into the campus backbone. All permanent faculty and staff members have multimedia-capable computer stations in their offices with 17" monitors and Ethernet connections. Grants have provided SOE faculty with professional development opportunities and support materials. School of Education has shared full time technician support (Macintosh and PC) with other departments within the College of Health, Education, and Social Welfare. To support the use of technology in the academic programs within the SOE, a student technology fee is assessed on any student taking any SOE course on the UAA campus. The implementation of this fee has resulted in the availability of modern technology resources and support for students. Students have access to multimedia computers, color scanners, color printers and other equipment in the SOE computer lab. A lab technician is always available while the lab is open to assist students. As part of a continuing effort to improve the integration of educational technology in teacher education, a needs assessment was conducted in the School of Education to determine the state of faculty technology use for teaching and learning.

The Study

Sixteen permanent SOE faculty members were interviewed in April 1999 to determine areas of strength and areas of need. Faculty were asked how they integrated technology in their teaching and their expectations for student use of technology in their classes. The *Teacher Educator Integration of Technology Skills, Concepts, and Standards into K-12 Teacher Education Programs* instrument (McCoy, 1998) was used to gather quantitative data. The questions were based on the ISTE/NCATE Foundation Standards (Thomas et al., 1997) and the types of integration as identified by *Teachers and Technology Making the Connection* (OTA, 1995) as supportive of technology integration. Quantitative data were analyzed with the Wilcoxon Matched-Pairs Signed-Ranks Test using SPSS. Areas of strength and areas of need were identified. Qualitative data were gathered as faculty defined the barriers and identified needs to be able to integrate technology in their teaching and learning. Data analysis was inductive. The results were presented to the administration in a SOE Education Technology Use Report.

Findings

All faculty members interviewed have used computers for a long period of time. Previous studies have shown that length of use does not necessarily lead to greater integration of technology in teaching. Other factors, including computers with Internet access, on-site technology support, time needed to use computers, training, access to adequate hardware and software, and opportunities for faculty to see multimedia computers used effectively to support teaching and learning are needed for that to occur (OTA, 1995).

The survey found that faculty expect students to use word processing and telecommunications. Most do not expect students to be able to operate multimedia computers or to use technology in learner centered classrooms. Only a few faculty use local, state, and national technology standards in their teaching.

Students have few opportunities to observe faculty using technology in courses. They rarely have the opportunity to use a wide range of technologies in the classroom. Lack of facilities, a smart classroom or laptop computers with a projector; limit the methods of technology use available to faculty.

All faculty members mentioned lack of time as a major barrier. On-site technology support, time needed to use computers, training, access to adequate hardware and software, and opportunities for faculty to see multimedia computers used effectively to support teaching and learning were all found to be significant areas of need. Most faculty stated that professional development opportunities have not been available at a time and in a manner that is appropriate for their learning. Many lack knowledge of how to use available hardware and software.

Expectations for Students to Use Technology

The needs assessment found faculty expectations for student use of word processing, communication and on-line resources, and computer-based technologies (including telecommunications) to access information (27% of survey items) to be areas of strength. Seven out of eight remaining items (64% of items), generally those skills needed to operate a multimedia computer, to use technology as a tool in a learner centered classrooms and those technologies which support different learning styles and needs were found to be significant areas of need. Faculty expectations for student use of technology do not prepare students to meet *ISTE/NCATE Foundations in Technology for all Teachers* nor the *Alaska Teacher Standards*. Faculty are not providing models of appropriate technology integration for their students.

Support for Use of Technology

School of Education faculty described the support they receive from the university. One item (17%), a computer with Internet access available at work, was found to be an area of strength. The other five items (83%): on-site technology support, time needed to use computers, training, access to adequate hardware and software and opportunities for faculty to see multimedia computers used effectively to support teaching and learning were all found to be significant areas of need. When universities provide these support items, faculty are more likely to integrate technology into their teaching (OTA, 1995).

Barriers to Integration of Technology into Teaching and Learning

Several themes emerged as faculty identified the barriers that kept them from integrating technology in their teaching and learning. They cited lack of time, lack of facilities, lack of technical support, and equipment issues as major reasons they do not use more technology in the classroom. Curriculum issues, as well as, administrative issues, training, and budget comprise other barriers. They also often found it difficult to coordinate work with other departments on campus.

Training needs are not currently being met for a variety of reasons. Faculty development classes are scheduled at an inconvenient time, are not on topics of interest to them, or are in formats they are uncomfortable with. Providing professional development in a variety of ways would serve them better. Many would like to learn "as needed" while others would like help with specific subjects. They asked for a faculty workroom where they could learn informally from each other, prepare materials, and learn in small groups. They would like to learn to use the software that is available to students in the computer lab. They would like to know more about how to incorporate technology into the K-12 classroom and into their teaching.

Faculty Needs for Incorporation of Technology into Teaching and Learning

When asked what they needed to be able to use technology for teaching and learning about half of the faculty identified laptop (both Mac and PC) computers. Other items requested were high-end computers, color printers, access to digital equipment and the same software that students have. They would like readily available technical support for both hardware and software, for distance course development, and for development of web pages.

UAA SOE faculty report they have not seen technology being adequately and appropriately used in the K-12 schools that they visit. The status of technology in the Anchorage School District impacts this proposal because the UAA SOE places students in local schools for practicum and student teaching experiences. To meet NCATE standards preservice teachers need to use technology throughout their teaching experiences.

Hardware and Software

Faculty members developed individual lists of hardware, software or other support needed to facilitate incorporation technology into their teaching and learning. About half of the faculty identified laptop computers (combination of both Mac and PC), with mobile projection units to use in smart classrooms, as equipment they need to incorporate technology in their teaching. Some would like equipment for students to check out to use in the field. E-mates (no longer made) or something comparable that is practically indestructible.

Faculty asked for a variety of software applications. In addition, they felt is was important to have the same software that their students have. They would like to be able to read any documents they receive. They would also like to have technology support for whichever platform they choose. They would also like to be able to access their work computer at home.

Faculty Development

Training needs are not currently being met. There are a variety of ways to provide professional development. Many would like to learn "as needed" while others would like specific subjects. Some would like coaches to work with them. They would like low key demonstrations of capabilities of things we have available in the SOE. They would like training to use digital equipment. They would like training to learn to use a variety of different software applications.

They would like a faculty workroom where they could learn informally from each other. They would like the opportunity to meet with others in their field at regional and national meetings. They would like to know more about how computers and technology are being used in the K-12 classrooms as well as how to use elementary software and have time to practice.

Technical Support

Technical support is very important. They would like readily available support for both hardware and software that is accessible when needed. Faculty would like more ready access to technical person for help with

software problems on an as needed basis. They would like support for distance course development and for development of web pages. They need technician who comes in to office in a timely manner, to troubleshoot and stay until problem is fixed, and a choice of what is updated. They would like to define what they need and have technical services provide it.

Facilities

Many faculty are not aware of what is available to students in the SOE Computer Lab. They would like a tour of the lab and the opportunity to learn to use the hardware and software students have access to.

The School of Education will be remodeled in the summer of 2000. The faculty are interested in developing classrooms that will promote the integration of technology in teaching and learning. When the new classroom is designed, faculty would like PowerPoint capable hardware in every classroom, video capability, a smart room with anything that is appropriate for the subject matter being taught, and videoconferencing capabilities.

Other Support

Everyone needed time for learning, for course development, and for technology related activities. There is also a need for a technician to assist with online course development, course revisions, and web page development. They would like help getting courses online and a secure spot (server with course management software) to house them. They would also like the technology funds to be allocated to the SOE to the same extent they have been allocated to other departments. The greatest need seemed to be TIME and assistance as needed.

Conclusions

The Office of Technology Assessment of the U.S. Congress published a report in 1995 called, *Teachers & Technology: Making the Connection*, which found: "To use new technologies well, teachers need more than just access to these resources, they also need opportunities to discover what the technologies can do, to learn how to operate them, and to experiment with ways to best apply them in their classrooms." The report recommends avoiding the common approach of "short-term, one-shot training to familiarize teachers with a specific application or encourage general computer literacy" in favor of more long-term training that centers on the relationship between technology and the teacher's role. "Helping teachers effectively incorporate technology into the teaching and learning process may not only help students become competent technology users, but may also help them become more accomplished learners overall, with skills necessary for the

Technology and the New Professional Teacher: Preparing for the 21st Century Classroom (1997) that highlights the impact of technology on society and the importance of redesigning teacher education programs to prepare teachers for the new demands of the classroom.

Recommendations from the UAA SOE Faculty Technology Use Report included the need to provide adequate technical support; to involve faculty in technology planning and design issues; to provide a variety of training opportunities in several formats; to upgrade hardware and software, to provide equipment for classroom use of technology and to provide time and administrative support for the integration of technology into teaching and learning.

A plan was developed to help faculty build a vision for technology integration into teacher education. Strategies for faculty development and program development were identified and implemented. Three goals for further development of technology integration were established. They include: 1) Preservice teacher education courses will be redesigned to reflect best practice and include the infusion of appropriate technology throughout. 2) Faculty will have the training they need to successfully integrate technology into their courses. 3) Students will have experiences that enable them to demonstrate effective and appropriate use of technology based on ISTE/NCATE standards.

Models for faculty, and program development were designed. The models did not focus on the isolated acquisition of technology skills, but concentrated on the rationale and strategies for integrating technology across the curriculum. They were designed to provided faculty an opportunity to experience collaborative,

problem based learning. The models were incorporated into a successful Preparing Tomorrow's Teachers to Use Technology Capacity Building Grant. They also support technology integration in a successful Alaska Partnership for Teacher Enhancement Grant.

Faculty Development Model

Faculty will have the training they need to successfully integrate technology into their courses. A community of learners (COL) will be created to help all members of faculty realize the need to take responsibility for integration of technology and to help them acquire the skills and attitudes needed to infuse technology into the curriculum. The faculty will be invited to join the community of learners, as they are introduced to a new "work room" and provided information about faculty development opportunities. Faculty will become comfortable working in both an on site and an online collaborative environment. To meet the diverse development needs of the faculty, several types of learning opportunities will be developed, including online and CD ROM materials developed by our partners, as well as, one-on-one sessions provided by the ACT 3 methods faculty member. Apple Computer will provide online professional development opportunities that will allow the faculty to complete courses in applications and integration of technology on their own time schedule. Multimedia in the Classroom and Internet in the Classroom will give them specific examples of appropriate uses of technology in teaching and learning.

As the faculty become comfortable with applications the focus will move beyond basic technology skills to learning to use applications, such as the use of data bases and spreadsheets, to promote problem solving, higher order thinking skills, and effective communication in targeted student standards. Faculty will investigate strategies and techniques for the development of technology-integrated units that engage students in these processes and produce higher achievement, especially in under-achieving schools. They will have the opportunity to participate in ASD technology development activities. The "work" room will serve as a place for faculty to share learning, collaborate on joint projects, and to develop the community of learners. It can be used in conjunction with the ACT 3 methods classroom activities. Further opportunities for collaboration and professional development will be available through supporting attendance at national technology conferences.

Program Development Model

The Alaska Partnership for Teacher Enhancement Grant (APTE) is a five-year grant to redesign the teacher education program. Program Development Design Teams, composed of members of the SOE and CAS faculty, teachers, parents, and business partners, meet online and face to face, to restructure the School of Education and redesign courses. Activities will be provided to guide them as they develop and pilot methods for learning about best practice and integrating technology into the curriculum. They will develop a vision for teaching and learning which includes the use of technology and develop a model for redesign of preservice teacher education courses. The work groups will investigate larger technology issues that relate to parents and community as well as education. They will also have access to training in the Faculty Development sessions.

To help them develop the vision needed as they experiment with using technology in their current courses and model use of technology in the field, faculty members participating in this project will receive laptop computers with software comparable to what the students have in the SOE lab. A small projector and "smart cart" with student laptops will be available for check out. Apple Computer will conduct a workshop on mobile computing that is based on their work with other schools.

By the end of the 1999-2000 school year, members of both teams will have participated in three on site meetings and online collaboration. They will have developed the vision and skills needed to integrate technology into their teaching. Our goal is that by the end of the spring semester, UAA faculty will use the laptop computers and the "smart cart" in the classroom weekly.

Evaluation of the project is ongoing. More faculty members were interviewed this fall. Their current syllabi were assessed for current technology integration strategies. Records are being kept for each activity and assessments and evaluations help guide the projects. At the end of the school year, activities will be evaluated for their effectiveness.

References

Alaska Department of Education (AK DOE) (1997). *Standards for Alaska's teachers*. [Brochure]. Retrieved October 5, 1999 from the World Wide Web http://www.eed.state.ak.us/qschools/teacherstandards.pdf

McCoy, A.H. (1998). *Integration of technology into higher education teacher preparation programs*. Unpublished doctoral dissertation. University of Idaho, Moscow.

National Council for Accreditation of Teacher Education (NCATE). (1997). *Technology and the New Professional Teacher: Preparing for the 21st Century Classroom* Retrieved October 5, 1999 from the World Wide Web: http://www.ncate.org/projects/tech/TECH.HTM

Thomas, L., Friske, J., Knezek, D., Taylor, H. & Wiebe, J. (1997). *National standards for educational technology* [Brochure]. Eugene, OR: International Society for Technology in Education.

U.S. Congress Office of Technology Assessment (OTA). (1995). *Teachers and technology: Making the connections* (Report No. OTA-HER-616) [On-line]. Retrieved March 1999 from the World Wide Web: http://www.wws.princeton.edu/~ota/disk1/1995/9541.html

Teaching Well With Technology: An Educator's Guide to Wise and Time-Efficient Use of Instructioinal Technology

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Abstract. The Teaching Well With Technology workshop was created in an effort to provide faculty members with a systematic way of thinking about desired outcomes, use of time and space, and potential impact of technology for their classes. For the purpose of the workshop and our consultations with instructors, Educational Technology is defined as any human-made tool used to enhance the learning process. This session provides the rational for and an overview of "Teaching Well With Technology: An Educator's Guide to Wise and Time-Efficient Use of Instructioinal Technology" workshop. It is a full day workshop that resulted from a collaboration between the John A. Kaneb Center for Teaching and Learning and Educational Technology Services at the University of Notre Dame with support from AT&T.

Introduction

The Teaching Well With Technology workshop was created in an effort to provide faculty members with a systematic way of thinking about desired outcomes, use of time and space, and potential impact of technology for one of their classes. For the purpose of the workshop and our consultations with instructors, Educational Technology is defined as any human-made tool used to enhance the learning process.

The workshop is structured to provide the participants with an opportunity to select tools and strategies based on clearly identified learning goals that they define for one of their courses. Technology is demonstrated and discussed but there is no hands-on use of technology during the workshop. This format helps to avoid the tendency to find a problem to fit a "cool" technology solution. It also reduces the amount of time instructors spend learning technologies that are not viable solutions for their classes by helping them eliminate tools and strategies that are not likely to succeed before spending the time to learn how to use them.

The workshop is a result of collaboration between the John A. Kaneb Center for Teaching and Learning and Educational Technology Services (ETS) at the University of Notre Dame and has been underwritten by a grant from AT&T. The collaborative relationship between the Kaneb Center and ETS began when the center opened and has lead to the merging of some of the functions of the two groups and the appointment of two educational technology specialists as assistant directors of the Kaneb Center effective July 1, 2000. In addition to the workshop we consult with faculty and teaching assistants to assist them in the selection and implementation of technology tools that will help meet identified learning goals. A typical consultation with an instructor begins with the development of a mutual understanding of the goals for a course. When the goals have been clearly identified, tools or methods that may assist in achieving them are considered. These tools or methods may or may not be based on computer technology. The tools and methods identified are then evaluated to determine whether they fit with the instructor's style and to determine if they fit within time pressures and other external constraints (infrastructure, support, etc.).

The Workshop

The workshop consists of the following Seven Steps:

1. What Do I Want My Students to Learn
2. Identify the Best Teaching Approaches
3. Plan Major Assignments and Exams that Will Teach and Test the Learning that You Want
4. Plan Times and Spaces for Learning
5. What Technology Tools Can & Cannot Do
6. Choose the Technology
7. Implementation, Evaluation, Think Creatively

Step 1: What do I want My Students to Learn?

This first step of the workshop is used to focus the participants on the learning goals for a specific course that they teach. It is very important to take this step so that the decisions made later can always be tied back to the goals for the course. Basic instruction is given on the importance of defining clear measurable goals that will be useful for informing the choices made throughout the remainder of the day. The participants are encouraged to use specific terms such as describe, analyze, argue, solve, create and compare and avoid vague terms such as know, understand and be exposed to while listing their goals. At the end of this step, each participant has a list of goals that they will use to inform their choices throughout the remainder of the workshop.

Step 2: Identify the Best Teaching Approaches

In this portion of the workshop the best teaching strategies for undergraduate education are outlined and discussed. The focus of this section is the importance of increasing student involvement as a method to enhance the learning process, followed by the discussion of ten teaching strategies that may be used to attain the desired increase in student involvement.

Student Involvement is the Key to Learning

> "The theory... Students learn by becoming involved... seems to explain most of the empirical knowledge gained over the years about environmental influences on student development... What I mean by involvement is neither mysterious nor esoteric. Quite simply, student involvement refers to the amount of physical and psychological energy that the student devotes to the academic experience." (Astin, 1985, pp. 133-51)

> "Analysis of the research literature... suggests that students must do more than just listen: They must read, write, discuss, or be engaged in solving problems." (Bonwell & Eison, Executive Summary, n.p.)

> "The body of research on the impacts of the college academic experience is extensive...The strongest general conclusion [is that] the greater the student's involvement or engagement in academic work or in the academic experience of college, the greater his or her level of knowledge acquisition and general cognitive development." (Pasquerilla & Terenzini, 1991, p. 616)

Ten Teaching Strategies Suggested by Research

1. Have students write about and discuss what they are learning.

> "Learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives. They must make what they learn part of themselves." (Chickering and Gamson, 1987, p. 3)

2. Encourage faculty-student contact, in and out of class.

> "Frequent interaction with faculty members is more strongly related to satisfaction with college than any other type of involvement, or, indeed, any other student or institutional characteristic." (Astin, 1985, pp. 133-151)

3. Get students working with one another on substantive tasks, in and out of class.

> "Students' academic performance and satisfaction at college are tied closely to involvement with faculty and other students around substantive work." (Light, 1992, p. 18)

4. Give prompt and frequent feedback to students about their progress.
5. Communicate high expectations.
6. Make standards and grading criteria explicit.
7. Help students to achieve those expectations and criteria.
8. Respect diverse talents and ways of learning.
9. Use problems, questions, or issues, not merely content coverage, as points of entry into the subject and as sources of motivation for sustained inquiry.

> " Students learn what they care about and remember what they understand." (Erickson 1984, p. 51, cited Bonwell & Eison, Executive summary, n.p.)

10. Make courses assignment-centered rather than merely text- and lecture-centered. Then focus on helping students successfully complete the assignments. (Astin, 1985: Bonwell and Eison, 1991; Chickering and Gamson, 1987; Erickson, 1984; Frost, 1991; Kurfiss, 1987; Light, 1992: Pascarella and Terenzini, 1991; Penrose, 1992.)

Step 3: Plan Major Assignments and Exams that Will Teach and Test the Learning that You Want

In this section of the workshop, we review the learning goals that the faculty members have identified and point out the frequent mismatch between these goals and the traditional coverage centered model of course planning. We do this by creating a course skeleton that shows using the coverage centered model and then creating a new skeleton using an assignment centered approach, identifying the major assignments and exams then inserting them in the week in which they are due. We then ask participants to ask these questions. Are the assignments likely to elicit the kind of learning you want? Consider what the assignment is called, will an assignment called a "Term Paper" get the same response as one called an "Argumentative Essay"? Consider the context in which students produce work (time frame, level of memorization required, and accessibility of help and likely work strategies). Are the assignments and exams manageable in terms of number, type, length, and spacing across the semester?

During this section we suggest to participants that it is better to concentrate on a few, well-chosen assignments and exams rather than to proliferate ill-conceived ones. Sometimes, "Less is more". We also discuss the importance of content. The assignment-centered approach does not excuse the students from learning the content but focuses the learning of content as needed for the completion of assignments.

Step 4: Plan Times and Spaces for Learning

In order to discuss times and spaces we first define three aspects of the learning process. These are **first exposure**, during which the student first hears/sees new information, concepts, procedures, etc. **Process**, during which the student applies, critiques, contrasts, synthesizes, argues, analyzes, etc. Process usually results in a product such as a test, exam, assignment, lab or clinic, performance, etc. The third aspect is **response**, during which the teacher, assistant, or peer responds to the product of student work.

The next step in the discussion of times and spaces is to look at how times and spaces are used to accommodate the three aspects of learning we have defined. To do this we compare the use of times and spaces in a traditional lecture vs. an interactive model for a class.

	Students with Teacher (Class)	Student(s) "Study" Time	Teacher Alone
Traditional Lecture Method	first exposure	process	response
Interactive Method	process, response	first exposure	

Table 1: Aspects of Learning for Instructional Method vs. Times & Spaces

Notice that in the interactive method the teacher alone time is no longer spent responding to student work. This is positive in that the time can be used for other tasks and that response is moved to a time when it is much more likely to be effective for the students. Also, notice that by moving the first exposure to the student study time the more difficult task of process can be handled while the instructor is available to help with it. At this point in the workshop we discuss several cases of instructors that we have worked with and how they changed their courses to take advantage of these alternate ways of using time and space. To illustrate our point the Teacher alone time is left empty for the interactive method in this table. In the workshop we discuss the possibility that there will still be some amount of response to student work that happens in teacher alone time. At this time we also discuss alternate times and spaces such as lab, clinic, or recitation which may be used for first exposure, process, or response and office hours.

Basic Principles for Using Times and Spaces

1. Increase student time on task.
2. Involvement is the key to student learning.
3. Invest teacher time in the most difficult aspects of learning and/or aspects of technology that TA's or students cannot do alone.
4. Use peers or TA's appropriately; train and guide them for their tasks.
5. Make students responsible for first exposure in their own time or with TA's and peers.
6. Use technology to create, expand and enhance times/spaces and to accomplish all of the above.

Times and Spaces Created/Enhanced by New Technologies:

New technologies mean that the class, lab, clinic and recitation may be face-to-face or distributed and synchronous or asynchronous. Web pages, interactive software and multimedia are now available to students in their alone time and students' time with peers outside class, the instructor and TA's may be face-to-face or distributed and synchronous or asynchronous. Individual technologies that facilitate these changes are discussed in the next step of the workshop.

Step 5: What Technology Tools Can & Cannot Do

This section of the workshop is spent discussing various types of computer based technology tools and presenting cases that illustrate how they have been used successfully. In our cases we explicitly identify how the use of the technology ties in to the ten strategies suggested by the research and alters the potential uses of times and spaces. We do this by talking about a variety of categories of tools and providing examples of them to go along with the cases concerning their use. The tools that we cover are:

1) Collaborative Writing Tools: Tools in this category allow multiple authors and reviewers to interact with a document. The authors or reviewers are associated with the comments and or edits that they perform. This type of tool can be used by groups of students (or colleagues) to collaborate on a document. They also provide an excellent method to grade student work in a paperless environment. Examples of this type of tool include the reviewing features of Microsoft Word and Sixth Floor Media's CommonSpace.
2) Presentation Software: Facilitates the display of text, graphics, sound, video and other media and provides a relatively simple environment for the creation of presentations using these types of media. Also allows

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for easy update and customization of presentations and for presentations to be made available for use outside of class. Microsoft PowerPoint is an example of this type of tool.

3) E-mail: Usually considered a one to one communication tool (may be one to many using aliases or nicknames). It is asynchronous (does not require the presence of both parties at the same time) and facilitates professor/student and student/student interaction. May reduce stress for those who don't feel comfortable with verbal interaction.
4) Listserv/Bulletin Board
   a) Listserv List: This tool provides asynchronous group communication using e-mail. List subscribers are able to exchange e-mail with all other subscribers by sending mail to a single common address. Listserv facilitates professor/student and student/student interaction and may reduce stress for those who don't feel comfortable with verbal interaction. Examples include Listserv and Listproc lists.
   b) Bulletin Board: This type of tool provides asynchronous group communication requiring login to Bulletin Board System (often web based). Facilitates professor/student and student/student interaction and may reduce stress for those who don't feel comfortable with verbal interaction. Bulletin boards allow creation of a forum for each topic to be discussed and display messages organized by topic. Both of these features are advantages in online discussion of course topics. Examples include WebCT"s and Blackboard's bulletin board systems.
5) Chat/Conferencing: These tools are designed to facilitate synchronous (all parties present at the same time) electronic discussions. They facilitate professor/student and student/student interaction and may reduce stress for those who don't feel comfortable with verbal interaction. Text based systems do require keyboarding skills for full participation. Participants use chat software or other conferencing software to connect to a common server that allows them to interact as a group. The keyboard is the input device in simple forms with more complex forms including white board, audio, video and application sharing. Examples include IRQ, WebCT, Blackboard and AOL Instant Messenger (text based and white board) and NetMeeting and CUSeeMe (video conferencing with text chat and whiteboard available).
6) Web Pages: Simple web pages facilitate display of and interaction with information that may be presented as text, graphics, sound, video and animation. They also allow linking of course materials to a larger body of information and can be used to "publish" student work. Simple web pages can be used to move first exposure outside of the class time. If students are the creators then they can also facilitate the increased involvement that leads to improved learning.
7) Integrated Course Delivery Systems: Products available allow the development of a one-stop location that provides the functionality of E-mail, Listserv and Chat along with presentation of information. These tools facilitate the creation of complex, interactive sites that may include on-line self-evaluation or testing, drill and practice, etc. Examples include WebCT and Blackboard CourseInfo.
8) Interactive Course Software: Applications that provide instruction and responses that may include multimedia elements. They could be web based (using one of the products above) or stand-alone applications and may be custom designed or commercial products. Examples include ADAM (anatomy and physiology), Progetto Italica (ND Italian language learning software).
9) Simulation: A presentation that attempts to model a real-world or theoretical process or event. Simulations may be used to show a simplified view of a real world event to facilitate understanding. They are most effective when they require student involvement/interaction. Examples include PCMolecule (Molecular Modeling), Orbital Motion simulation (http://www.nd.edu/~edtech/orbital).

Step 6: Choose the Technology

In step six we look at our sample course outline with major assignments and necessary steps mapped to the semester. Then considering the goals for that course we select technology tools that would help to achieve those goals and map them in the appropriate locations. Once they are mapped, we ask the following questions. Does it lead to learning/teaching improvements? Does it enhance community? Does the strategy fit with philosophies, priorities, and styles of teaching? Is it Feasible? Is the strategy consonant with time pressures and other constraints? The tools that pass these questions are then evaluated and one or more are selected for implementation in the course. Participants then go through the same process with their own courses.

Step 7: Implementation, Evaluation, Think Creatively

In step seven we discuss the methods to improve the likelihood and awareness of success. We suggest implementing in small steps when possible. Trying to use the new tool to do something you're already doing and to do something you've never done or to do something in a radically new way. We also discuss the importance of evaluation, even if informal. Finally, we talk about using this time of change as an opportunity to rethink in major ways by asking questions such as: What is teaching? What is my role as a teacher? What is learning? How do my students learn? What is "class"? How can I use times and spaces more effectively? What is the optimal relationship between students and teacher and students and students? And how can my time, TA and peer assistant time, and student time best be used?

Conclusion

This workshop works well because the focus is on teaching and learning. Technology tools are treated like other tools and methods and only selected when they will help meet learning goals and fit within the instructors style and other constraints.

References

Astin, Alexander. (1985). *Achieving Educational Excellence.* San Francisco: Jossey-Bass.

Bonwell, Charles C., & Eison, James A. (1991). Active Learning: Creating Excitement in the Classroom. *ASHE-ERIC Higher Education Report No. 1.* Washington, DC: The George Washington University, School of Education and Human Development. (Executive Summary, n.p.).

Chickering, Arthur W., and Gamson, Zelda F. (1987). Seven principles for good practice in undergraduate education. *The Wingspread Journal.* Available from the Johnson Foundation, P.O. Box 547, Racine, WI 53401-0547.

Feldman, Kenneth A. (1987). Research productivity and scholarly accomplishment of college teachers as related to their instructional effectiveness: A review and exploration. *Research in Higher Education*, 26, 227-298.

Feldman, Kenneth A., (1988). Effective college teaching from the students' and faculty's view: matched or mismatched priorities? *Research in Higher Education*, 28, 291 - ?.

Frost, Susan H. (1991). Contact, involvement, and persistence: Contributors to students' success. In Academic Advising for Student Success: A System of Shared Responsibility. (pp. 9-13 and references, pp. 77-91). *ASHE-ERIC Higher Education Report No. 3. Washington, DC*: The George Washington University, School of Education and Human Development.

Kurfiss, Joanne (1987). Critical Thinking. *ASHE-ERIC Higher Education Report.* Washington, DC: The George Washington University, School of Education and Human Development.

Light, Richard J. (1992). *The Harvard Assessment Seminars: Second Report.* Harvard University School of Education.

Pascarella, Ernest T., & Terenzini, Patrick. (1991). *How College Affects Students.* San Francisco: Jossey-Bass.

Penrose, Ann M. (1992). To write or not to write: Effects of task and task interpretation on learning through writing. *Written Communication*, 9, pp. 465-500.

Ten Years of Technology Training for Faculty

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Abstract: Assuring that education faculty members use educational technology effectively in their classes requires that they know and use technology themselves. This paper shares the experiences of a college of education's 10 year effort to train faculty to use and infuse technology. The college has held an annual 1-3 week technology awareness and training session for the past 10 years, along with several other efforts to help prepare professors, instructors, and staff. Keys to success are included in this paper, as well as an effort to look at the future possibilities and challenges for education faculty development.

Introduction: The Challenge of Helping University Faculty Become Equipped to Prepare Preservice and Inservice Teachers to Use Technology

Preparing teachers to use educational technology in classrooms is an important and exciting challenge for the educational community, especially teacher preparation institutions. Teacher education is often criticized for the inadequate preparation of education majors concerning the use of educational technology in the teaching/ learning process. In a 1995 study, Colon, Willis, Willis, and Austin (1995) reported that on a nation-wide survey, over one-half of the teachers who graduated within the last two years believed they were not well prepared to use educational technology in instruction. In a more recent study, first year teachers indicated that their preparation to teach with educational technology lagged behind their preparation for other instructional strategies (Strudler, McKinney, Jones, & Quinn 1999).

In addressing the issue of educational technology infusion in teacher education programs, several national and international organizations, such as the Society for Information Technology and Teacher Education (SITE), the International Society for Technology in Education (ISTE), and the National Council for Accreditation of Teacher Education (NCATE), have focused attention to the problem by holding conferences, publishing journals, and writing standards. In addition, many states, including Nebraska, have developed minimum technology compentencies for educators. Changes in the amount of technology preparation in teacher education are a substantial challenge, but these changes are important to the future of education and its institutions. One of the most important factors in improving technology preparation of students is the increased use of technology by faculty, especially in the classroom setting (Persichitte 1998; Kent & McNergney 1999).

The faculty of the College of Education at the University of Nebraska at Omaha has developed a model for the integration of education technology into teacher preparation programs. This model was designed to adapt teaching methodology and curriculum in response to ever changing educational technology innovations. The need for infusion of education technology into the teaching/learning process was identified as a major goal by the college ten years ago. The goal was divided into teaching with educational technology, teaching about educational technology, integrating educational technology into the design and delivery of curriculum, and engaging in research regarding the use and impact of educational technology in the teaching/learning process.

The college established an Educational Technology Task Force, comprised of faculty, administrators, and support staff from all departments. This group was instrumental in providing operational direction to the educational technology vision of the college. This task force worked in concert with information provided by a similar group of educational technology personnel representing the Metropolitan Omaha Educational Consortium (MOEC) comprised of seven local school districts. Input from the two task forces provided input which resulted in:

- a formal College of Education mission statement for educational technology
- goals and objectives for the college in the area of educational technology
- educational technology competencies expected of all preservice and inservice teachers
- a coordinated plan for the purchase of all educational technology hardware and software for the college
- suggested research studies and topics reflecting the type and amount of educational technology utilized by the faculty of the college
- a formal advisory group to the dean of the college for feedback and future directions related to educational technology integration

Three Components for Increasing Faculty Use of Technology

Three general components were paramount for the increased faculty use of educational technology in the College of Education at the University of Nebraska at Omaha: 1) access to equipment, both in offices and classrooms, 2) expectation from the institution that effective educational technology be used, and 3) training and assistance to use technology, both personally and professionally.

Component 1: Access to Equipment, Both in Offices and Classrooms

During the past ten years, a concentrated effort has been underway within the College of Education to provide the technology necessary to prepare preservice and inservice teachers. Computers for offices and classrooms have been a priority. To equip faculty with current and appropriate desktop computers, two general guidelines were established, giving direction and rationale for these computers purchases. First, faculty members were allowed to choose either a PC (Windows) or a Macintosh for their office desktop computer. Second, high-end users would receive newer models, while trickling down their older computers to lower-end users. These guidelines provided general direction as the college moved ahead in giving basic microcomputer technology to each faculty and staff member in the college.

Early in the technology planning process, the college installed Ethernet connections in all faculty offices, instructional areas, computer laboratories, research laboratories, and support staff offices. The college local area network (LAN) is connected to the campus network, as well as the Internet. The room connections and the building wiring have been recently modernized to category 5 wiring and fiber optic space cabling. The file server for the college has been updated several times and is currently a Dell 300 MHz Dual Processor running Novell 4.11. The college will connect to Internet II soon.

Technology in classrooms and laboratories is important if faculty members are expected to infuse technology into their teaching/learning. The University of Nebraska at Omaha College of Education has developed, expanded, and updated this technology several times. Currently, several high-tech classrooms are available. These rooms have a computer, VCR, cassette deck, an audio board, an ELMO station, as well as a high quality ceiling-mounted projector. Several mobile carts, containing a computer, VCR, and projector are available for checkout to use in classrooms. A 30 station Mac lab, a 24 station Windows lab, and a 10 station Mac/Windows resource center are used for teaching, and other specialized research laboratories are also available to faculty and students.

Component 2: Expectation from the Institution that Effective Educational Technology Be Used

Many faculty are capable of believing that if educational technology is important enough for them to integrate it into their own classes, then technology is important enough to be an expectation for the institutional curriculum. In essence, it should be expected that all faculty will integrate technology into the

appropriate courses and situations. It is especially necessary for faculty to understand that they are not only supported in personal or office use, but also encouraged to use and model educational technology related teaching techniques. This support should be included in the merit, promotion, and tenure process.

Component 3: Training and Assistance in the Use of Technology, Both Personally and Professionally

The training and development efforts for the faculty of the college were designed around three levels: awareness, experience, and integration. On the awareness level, faculty members were provided with several opportunities merely to overview the vast uses of educational technology in the classroom. These sessions focused on getting faculty excited about, and aware of, the potential of educational technology use in the teaching/learning process. Also, it further provided faculty with a basic knowledge of several software programs. For the experience level, faculty members were given opportunities to experience some of the technology uses in a supportive and comfortable 'hands-on' environment, where knowledgeable individuals were available for assistance. For the integration level, the faculty participated in learning opportunities which focused on sharing how certain technologies might be used in instruction. This phase also permitted faculty to share with each other some of their integration projects and plans. Each of these training activities addressed improving instruction, expanding research, and increasing scholarship using the resources available through educational technology. This college-wide training of faculty and staff at each level has been addressed in various ways: summer intercession training, brown bag presentations, coaching/assistance teams, and the technology in education advancement model.

Summer Intercession Training

During the summer intercession the faculty had the opportunity to engage in hands-on training sessions in technology. These training sessions have typically been one to three weeks long. Initially, faculty was instructed in the basic use of a networked microcomputer laboratory along with its software. During the sessions, each faculty member developed projects that utilized educational technology relevant to their respective areas of expertise. From this beginning, the intercession summer training sessions became more individualized, focusing upon the specific needs and interests of participating faculty. More than twenty of the faculty per year has participated during the ten years this program has been in operation. In addition, the training format has been altered to provide large group instruction as well as one-on-one instruction and technical assistance.

The overall training during these intersession activities was designed to meet the needs of faculty members at their own level of expertise. The expertise of participating faculty ranged from those with very little knowledge of technology and no experience with its use in teaching, to those with some knowledge of technology who do not currently incorporate it into their teaching, to those currently using technology to some degree in their classroom instruction. All sessions encouraged faculty members to address their own specific needs and interests and to help be a resource to each other following the session. The following are examples of topics that have been addressed over the past ten years:

- productivity tools for curriculum integration (e.g. email, web browsers, ClarisWorks, MS Office, Hyperstudio, Persuasion, video editing, Harvard Graphics, and Micrograde)
- resource applications (e.g. instructional aspects of the Internet in support of the teaching/learning process, and authoring Internet-based materials using HTML, HomePage and Blackboard);
- experiential applications of integrated hardware and software resources available in high tech classrooms, mobile multimedia carts, and computer labs;
- integration of computer managed educational technology and media in the classroom; and
- restructuring teaching and learning applications using educational technology in a high-tech environment.

Brown Bag Presentations

In addition to the intersession training, the college also provided training throughout the academic year in a series of "brown bag" lunch hour presentations. The college's Educational Technology Coordinator and several technology using faculty members offered the presentations. These presentations primarily

focused upon the use and integration of software programs resident on the college's file server, which is connected to every faculty member's office and all instructional classrooms in the buildings used by the College of Education, via a local area network (LAN). Topics for these workshops included a variety of software applications such as MS Works, ClarisWorks, Paradox for Windows, SPSS, e-mail, and Netscape, as well as other high interest topics such as the use of multimedia and the Internet. These content-specific sessions, usually one-hour in duration, were followed by coaching and encouragement from the instructors, as faculty and staff members implemented their newly learned skills.

Coaching/Assistance Teams

After several years of training, technology integration was on the increase, but still, several faculty members struggled with the issue. To address this concern, a coaching/assistance program was piloted in two teacher education methods courses: elementary language arts and elementary science. A team of five educators was assembled for each of the two content areas. Each team consisted of the subject-specific professor (the course instructor), an area K-12 teacher, a Teacher Education Department graduate assistant, an educational media professor, and an educational technology professor. Early in the semester, each team met weekly to discuss ways that educational technology could be infused into the methods courses. After these discussions, the methods professor chose appropriate strategies, and the team assisted with the implementation of those strategies. Software was reviewed, activities designed, and equipment reserved or acquired by the team. During class periods when technology was used, team members assisted the professor in any way needed, and in some cases, members of the team actually instructed the class. All the educators in this program were positive about the program. The educational technology integration increased greatly, not only in these two undergraduate methods courses, but also in all levels of the program and support team. Participants indicated that they had learned a great deal about technology, including various teaching techniques, curricular concepts, and collaboration approaches.

The Technology in Education Advancement Model (TEAM)

Project TEAM-Internet (Technology in Education Advancement Model), was an innovative Internet based inservice model, supported by the Helena Foundation. Project TEAM-Internet was directed by the University of Nebraska at Omaha together with the Metropolitan Omaha Education Consortium (MOEC). This most recent project was the third of a series of Project TEAM grants addressing educational technology.

The general goals of the project included building a community of learners/educators who were interested, involved and trained in the use of the Internet in classrooms, as well as development of cutting edge models of Internet use in the teaching/learning process. The project sought to enhance the use of the Internet by involving 25 educators (both K-12 teachers and College of Education professors) in a comprehensive and extensive one-year Internet training program. The project participants met over a 12-month period, with sessions being held on two Monday evenings and one Saturday morning each month. Sessions included training on specific topics related to Internet use and resources and were conducted by both participants and outside experts.

One of the requirements of Project TEAM-Internet was the development of an Internet based educational project by each participant. Because the educators worked with kindergartners to graduate students, the projects were varied in topic and complexity. Each participating educator presented her/his project in a large showcase at the end of the year, with area teachers, administrators, and professors invited to attend the presentation.

The participating institutions agreed that it is indeed more effective to approach technology inservice through a collaborative environment, where resources and expertise are shared. One of the most impressive aspects of this collaborative approach has been the emergence of a committed and energetic network of individuals who are continuing to share their expertise beyond the initial two projects. This network of knowledgeable individuals is now a substantial resource to all initial partners in the project. Many of the individual integration products developed by the project participants are truly remarkable, and several local districts adopted individual participant projects as part of their overall school or district curriculum.

The program labored to prepare the participating educators to assume a true leadership role in the effective integration of the Internet into education. The project attempted to take a very practical and

comprehensive approach to inservice training, by involving participants in extended and well planned instruction that was carefully focused on classroom impact. Perhaps what was most encouraging in the project, however, was the change in the individual participants themselves. At the conclusion of the project, most, if not all, of the participants were equipped with the technical skills, as well as the general enthusiasm, to help others use the Internet confidently and effectively in the classroom. It appears that collaboration is indeed a possible key to helping educators keep current with Internet related technology. In essence, we are adding additional evidence to support the old adage that sometimes all it takes for success is a little help from a friend, or in this case a *TEAM* of friends.

The Future

Predicting what the future holds for educational technology is extremely difficult. The commonplace of today was, in many instances, unheard of just a short time ago. The integration of educational technology into the design and delivery of instruction is definitely on a fast track. Faculty members are continually finding innovative ways to use technology in educational settings. Software and hardware manufacturers are moving ahead with new products that faculty will integrate into their teaching repertoire. Educators will see a tremendous increase in the development of teaching/learning models, which link technology developments with teacher preparation curriculum designed to better meet the learning styles of all students.

Although the future is uncertain as far as developments in software and hardware, there are some constants that are known. K-12 students have become visual learners, hence, preservice and inservice teacher preparation programs have adapted curriculum to effectively meet this learning style. The availability of computers, connectivity to the Internet, and on-going developments in educational technology will continue to strongly influence future teaching/learning environments. In addition, technological developments in the use of worldwide connectivity, broad band availability for distance education, lower costs for computers and related equipment, Internet II, software packages, and the adaptation of technology advancements from the area of information science and technology will fuel the use of educational technology in teacher preparation programs. Technological developments from the Jet Propulsion Laboratory and NASA are but two examples of scientific developments being adapted into teacher preparation programs. It is safe to say that the surface has just been scratched in the use of educational technology compared to where it will be in the next five to ten years and into the future.

College of education faculty will need to be on the cutting edge of educational technology, researching ways to better use current educational technology as well as how to infuse new developments into their curriculum. This small group of faculty will be a significant influence on colleagues, which will ultimately result in continued adoption of new instructional models.

Perhaps one of the greatest constants for the future is what has been learned in the past. There will be a need for new equipment, both software and hardware; training for faculty to assist in the integration of educational technology into the design and delivery of curriculum; and the continued expectation that faculty will indeed model the effective use of educational technology in teacher preparation programs. These three elements will be in constant flux. However, faculty in teacher preparation programs must continue to move forward in developing the very best teachers who can integrate educational technology into the design and delivery of instruction to all children.

References

Kent, T.W. & McNergney, R.F. (1999). *Will technology really change education? From blackboard to Web.* Corwin Press, Thousand Oaks, CA.

Persichitte, K.A. (1998). *Examples of best practice in the use and integration of educational technologies for K-12 teacher preparation.* Presentation at the Ninth International meeting of the Society for Information Technology and Teacher Education, Washington, DC.

Strudler, Neal B., McKinney, Marilyn O., Jones, Paul W., & Quinn, Linda F. (1999). First-year teachers' use of technology: Preparation, expectations and realities. *Journal of Technology and Teacher Education*, 7, (2).

Teachers' Distance Professional Development and Support Model

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Abstract: An efficient professional development program for teachers should be open, friendly, well-organized, capable of modifying, and self-contained. To satisfy these requirements, it must be built as a distance information and learning environment that offers access to various types of educational resources, to instructor-mediated independent and group training, communication and collaboration among all the participants in the program, and methodological support.

Introduction

Professional development (PD) programs for schoolteachers are of crucial importance as the quality of education depends heavily on teachers' expertise. Although teachers have completed preservice teacher training programs, the nature of schooling changes through ongoing instructional reform efforts. Thus, teachers need to be continuously engaged in PD to keep up with advances in the field, update their competence in the subject area and pedagogy, and improve the efficiency of their teaching and quality of students' learning. Developing and maintaining a PD program is a complex undertaking for it embraces a wide spectrum of pedagogical, psychological, and content area aspects of teachers' professional competence. It demands extensive time and funding commitments from the government, school and the teachers themselves. So, we, as teacher educators, must help teachers become life-long learners by developing efficient models for teachers' PD.

Professional Development

PD is a planned, continuous, life-long process of dynamic personal development in a certain area or several related areas, a "constant process of reinvigoration and growth" (4, 22). It is, certainly, teacher's own responsibility, yet, as his or her performance is evaluated by the outcome in the classroom, PD becomes a condition and an integral part of the teacher's career. However, we cannot expect all teachers to volunteer for PD, or know exactly what they need and how to do it. So, we have to develop a permanently accessible (just-in-time) system that, together with rich resources that any teacher is free to use via a menu of options, offers some kind of organized training and management. We need to establish a "dynamic process which will be self-sustaining for a significant amount of time" (4, 26) with a structure, training facilities, efficient collaborative activities, counseling and consulting, and communication between teachers involved in the same program, and with the instructors and experts in subject matter and methodology of teaching.

Technology for Professional Development System

Such a system should include up-to-date and effective PD and training programs, all the necessary learning materials and an easy access to qualified methodological help in addressing everyday classroom

issues. These problems are particularly acute for teachers in rural schools. An efficient system of continuous professional development and support that would assist them in all aspects of their pedagogical activities can be built on a multimodal approach developed in our TSAT Model (Training based on Systemic Application of Educational Technology) [5, 310-319]. The technological basis for this kind of PD involving both group and individual work, independent or instructor-managed, is computer-based telecommunications via the Internet: e-mail, listservs, bulletin boards, chat rooms and videoconferencing. These tools allow multiple representation of information, communication and collaboration with other people, and are regarded not as merely delivery tools but as "mediators of learning interactions in educational settings" (1, 240). This distance learning approach to PD has such advantages as mass accessibility, economic benefits, convenience, flexibility and immediate feedback.

System Structure

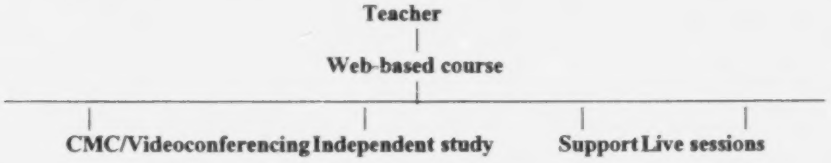
A Distance Professional Development and Support (DPDS) System developed on our approach consists of 3 modules: training, communication and information [6].

The training module includes on-line courses, computer courses, telecourses, automated tests, workshops and teleconferences. These courses can be either planned credited courses or non-credit courses for general learning. *The communication module* allows participants of the PD program to interact with the instructors of the course. It also serves the function of providing access to peers, experts, teachers engaged in the same PD program and colleagues outside the program and is a tool for cooperative and collaborative activities in the group. *The information module* provides current information on the developments in the field, access to distributed educational resources like on-line libraries, university databases, educator web-pages, to various materials for self-study and teaching collected in the DPDS bank, etc. This module can also be localized to tie in with a particular training module or course. It may include an automated methodological expert subsystem for continuous online teachers' support. There is overlap and intermingling of the modules' functions to a certain degree, but each serves a unique role.

To be efficient, this DPDS system should satisfy a number of requirements, among them openness, friendliness, flexibility, and capability for modification and improvement. The system must also be self-contained.

Training Module

The training module is a central component of the DPDS. It includes 5 important elements that are presented in the Integrated Model of Professional Development (IMPD):



A key unit in the system is the Web-based course. It provides structure for the course, learning materials, assignments, quizzes, readings, and calendar. Communication in the web-based course is supported by two groups of technologies: Computer-Mediated-Communication (CMC) including email, chat, and discussion groups, and videoconferencing (CU-SeeMe and whiteboard). Independent study is based on both the materials offered through the Web-based course and on the more traditional materials like books, audio and videotapes, floppy and laser discs. The Support unit is a multifaceted subsystem that provides resources including an automated expert system, a bank of teaching and learning materials, tests and quizzes for self-evaluation, and reference materials (online and print-based).

It is clear that this model makes complex use of a variety of educational technologies. Among other technologies used in the DPDS system, "computer- and video-mediated conferencing are tools especially suited for continuing social arrangements that enable the joint construction of knowledge. Discourse created by these tools provides and opportunity for prospective teachers to relate everyday classroom teaching experiences to theoretical knowledge acquired in university courses, and, conversely, to use theoretical knowledge to make sense out of everyday classroom events" (1, 238).

Model of Training

Application of this approach can be seen in this model of a complete training session designed for one lesson of a PD course:

Steps	Independent Activities	Small Group Activities (without instructor)	Whole Group Activities (instructor-mediated)
1	Course outline study		Video lecture
2	1. Independent learning 2. Project design	Group collaborative work (classroom video assessment)	Workshop (video conference)
3	1. Independent learning 2. Lesson preparation	Teaching practice in the classroom (videotaped)	Analysis, discussion and evaluation by the group (video conference)
4	1. Project development 2. Self-evaluation	Peer consultations and chat	1. Project presentation 2. Assessment 3. Lesson summary

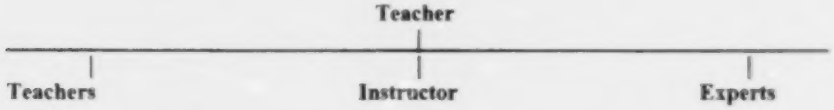
This model was developed from a number of experiences, in particular from our TSAT Model [5] and a corporate training scenario [2]. The 4-step lesson session that can take from 4 to 12 study days includes the types of activities necessary to provide efficient PD, starting with the new topic and material introduction (Step 1), offering various types of learning activities, both individual and group, that also includes a training classroom video assessment and every trainee's lesson analysis and evaluation (Steps 2 and 3), and ending with the project development, presentation and assessment (Step 4). It combines individual, small group and whole group collaborative work that may be either independent or instructor-mediated, and three kinds of assessment: self-evaluation with the help of automated tests, group evaluation and final overall instructor assessment. All the activities are supported through technology. Various types of feedback (general, selected group, individual) are possible depending on the students' needs.

It is worth noting that one of the main components of this model is practical lesson development and implementation by each teacher who is involved in a PD course. "Teachers develop as teachers through the process of teaching" (4, 24), or in the 'on-the-job' activities. Experience and PD come through research and practical performance in the real classroom (lesson preparation, implementation and self-evaluation) and training outside this classroom (lesson analysis, discussion and assessment by the peers and

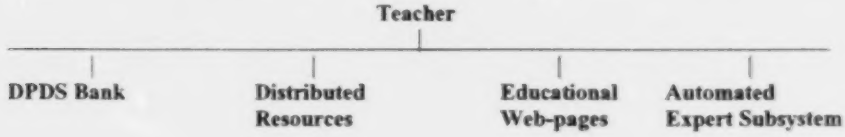
instructors), besides regular learning. So, practice teaching or micro-teaching and team-teaching with observation or videotaping of each class given by one of the teachers with subsequent group analysis and discussion is an essential part of this model.

Communication and Information Modules

Two other modules support the main training module. The communication module allows communication and collaborative activities among the teacher who is in a PD program, and three categories of communicative partners: other teachers, instructor and experts:



The information module provides access to several learning resources – system bank, distributed resources, educational web publications, and automated expert subsystem:



Face-to-face training

In addition to distance learning activities, live sessions are, in our view, a necessary part of PD and should be maintained wherever possible. Though they are not cost effective, they promote live, face-to-face interaction between the teachers participating in the PD course and their instructors thus allowing to preserve personal, human touch that is essential for educating people. Such a communication, undoubtedly, remains vital to education even in computer-based learning environments. To combine a distance, technology-based and traditional, live training, a "sandwich" approach to distance teacher training that involves periods of study alternating between on- and off-campus work can be very effective [3]. The main principle of the sandwich program is that it allows students to participate in face-to-face sessions periodically throughout the program. For example, students might begin the program with an intensive two-week summer session, then complete distant courses while working at their home schools, then return for another face-to-face session at the end of the program. Thus, they can continue both their careers and PD courses by alternating periods of intensive, group, instructor-supported study at the central location with periods of distance learning organized and mediated by a PD center while maintaining their regular teaching job.

Conclusion:

This DPDS model is actually teachers' informational and learning, social and technological environment that offers all the materials, tools, guidance and help needed to support their successful professional activity in the class throughout their careers. The strength of the model lies in the fact that the teachers' individual learning and PD is embedded in various social processes organized and supported via a system of educational technologies.

The DPDS system based on this model is designed to offer effective and cost-efficient teachers' PD. It can be expanded by adding intensive instructor-managed training sessions that help to preserve an optimal ratio between technology-based and live teaching/learning experiences. Students then engage in collaborative and individual work through both technology-mediated and face-to-face communication.

References

1. Blanton, W. E., Moorman, G. and Trathen, W. (1998). Telecommunications and Teacher Education: A Social Constructivist Review. In P. D. Pearson, A. Iran-Nejad (Eds.), *Review of Research in Education*, Washington, DC: American Educational Research Foundation, 1998, 23, 235-275.

2. Payr, S. Tele-Training on the Job: Experiments and Experiences in Media Education. (1999) *Proceedings of ED-MEDIA 99 World Conference on Educational Media, Multimedia, Hypermedia & Telecommunications. Seattle, WA, USA, June 19-24*, 276-81.

3. Purgasson, K. (1994) Distance Education for Training ESL/EFL Teachers. *Distance Learning in ELT*. Eds. K. Richards and P. Roe. Modern English Publications and the British Council. MacMillan Publishers, Ltd., London, 46-59.

4. Roe, P. Developments in Teacher Development. *Distance Learning in ELT*. Eds. K. Richards, P. Roe. Modern English Publications and the British Council. MacMillan Publishers, Ltd., London, 22-30.

5. Serdiukov, P. (1997) Theoretical Foundations of Language Teaching in Language Universities with Application of Information Technologies. Manuscript of Doctorate Dissertation. Kiev State Linguistic University.

6. Serdiukov, P. (1999) Design of a Distance System for Professional ESL Teachers' Support. *Proceedings of ED-MEDIA 99 World Conference on Educational Media, Multimedia, Hypermedia & Telecommunications. Seattle, WA, USA, June 19-24*, 1494-95.

Teaching the Teachers: Faculty Development Institutes at Two Universities

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Abstract: Many universities recognize the need for additional training in the proper uses of technology for their faculty. Schools have invested in the infrastructure and hardware, yet find that many of their faculty need time, guidance and instruction on how to best use technology in their courses. Faculty members are being asked to teach distance learning courses, using either the Internet, videoconferencing facilities or both. As we are well aware, teaching a university course via the Internet or videoconferencing is not the same as standing in front of a group of twenty students. Many faculty need assistance and information on the best practices which can be incorporated into their teaching of these types of classes. Many faculty are including resources found on the Internet in their courses or are developing web sites for the Internet which are then used in their courses. Faculty requests ranging from developing PowerPoint presentations to learning how to program in Java are becoming commonplace. Yet where does the faculty member go who wishes to utilize these new technologies, but who does not have the training needed to incorporate them into their courses? Some universities are offering faculty development institutes on-campus which address these issues.

Introduction

As our university campuses become more technology-intensive and our courses use more technology-based sources of information, we are finding that many faculty require and request training in using various technologies. Many universities are addressing these needs through combinations of workshops, training sessions and one-on-one mentoring. These 'faculty development institutes' provide much needed skills which the faculty member can then take back into the classroom in order to provide additional resources for their students. Universities take varying approaches to these institutes, ranging from on-going workshops, work sessions which cover several weeks, to intensive one day programs which cover very specific needs of the faculty member. This article will discuss the programs at two universities, and the on-going evaluation of these programs.

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The Faculty Development Institute at Auburn University Montgomery

Planning for the Faculty Development Institute at Auburn University Montgomery began Winter Quarter 1999, with the actual Institute conducted during Summer Quarter 1999. Several faculty members and the director of the Technology Center at Auburn University Montgomery began research into similar programs at other universities (primarily Florida State University and Virginia Tech) and quickly began planning to offer technology training at AUM. A committee was formed, consisting of faculty who were presently using technology in their classes and others who had expressed an interest in using technology to enhance their teaching. This committee dealt with two major tasks: defining how the institute would be conducted (the how, when, and what) and determining who would be the initial participants. The vice-chancellor at the university had provided funds for the Faculty Development Institute and participants were offered release time for one quarter for participating in the ten week institute. A call for proposals was delivered and the committee met to evaluate the requests and choose the participants. The range of the initial proposals was varied; some as little as a paragraph stating what the participant wished to learn, others, very detailed, covering how the participants would use the information learned in the institute in their classes. We learned from this that our call for proposals for the upcoming institutes would have to be very clear in detailing exactly the type of information we needed to better evaluate the proposals. As part of the initial proposal, faculty members were asked to rank their level of computer skills in several areas, ranging from software use to web page design. This information allowed the planning committee to determine which technology-based skills would best fit the selected participants. Skills requested by the program participants ranged from basic PowerPoint use, creating web pages to use as a supplement in the classroom, to creating web-based courses for use as a distance-learning class.

As a result of the proposal evaluation, twenty faculty members were selected to participate in the initial Faculty Development Institute. Ability levels, as noted by the participants themselves, ranged from very basic ("I only use my computer to do word processing and check e-mail", to advanced ("I am presently teaching classes in JavaScript."). It was decided to run the institute in two tracks: one for the more basic skills (PowerPoint, creating a web page) and one advanced (JavaScript, developing streaming video for use on web sites). The classes were combined when topics such as copyright issues and paradigms used for evaluating Internet-based classes were discussed. It was decided, during the planning stages of the institute, to use WebCT as the basis for creating web-based Internet classes as well as web pages for use in other classes. Students were initially introduced to creating pages using HTML and then were provided instruction in WebCT. Classes were held once each week for two hours. This schedule was decided upon due to the rapid nature in which the institute was being developed and offered (basically developed over a five month period, and our teaching loads are set months ahead of time). We found this schedule provided time for the participants to cover the various tools that are available through WebCT. The original idea was to introduce the concepts during the class and allow the participants to work and practice using the concepts during the next week. This was a very good idea in theory that was much harder to put into practice. Future institutes will allow for more in-class time that will allow the participants to develop and refine their work in a more instructor-accessible setting. Future institutes will meet during a regular class periods so that

the participants will have adequate time to develop the skills needed to become more independent.

The Faculty Development Institute at Old Dominion University

The process of planning the faculty technology workshops began by outlining competencies in eight areas. The "blueprint" for technological literacy for faculty members was developed by the college of education instructional technology committee. The committee is comprised of members from each of the college departments.

1. Instructional personnel shall be able to demonstrate effective use of a computer system and utilize software.

2. Instructional personnel shall be able to apply knowledge of terms associated with educational computing and technology.

3. Instructional personnel shall be able to apply productivity tools for professional use.

4. Instructional personnel shall be able to use electronic technologies to access and exchange information.

5. Instructional personnel shall be able to identify, locate, evaluate, and use appropriate instructional hardware and software to support Virginia's Standards of Learning and other instructional objectives.

6. Instructional personnel shall be able to use educational technologies for data collection, information management, problem solving, decision making, communications, and presentations within the curriculum.

7. Instructional personnel shall be able to plan and implement lessons and strategies that integrate technology to meet the diverse needs of learners in a variety of educational settings.

8. Instructional personnel shall demonstrate knowledge of ethical and legal issues relating to the use of technology.

Following the adoption of competencies by the committee, enablers were created for each of the competencies. Topics for the faculty technology workshops were selected to support the competencies and enablers.

Classes Offered at the Faculty Development Institute at Old Dominion University

A smaller committee of four instructional technology faculty developed the topics for the faculty technology workshops. Workshops were held in the college of education computer labs every other Thursday from 12:30 to 1:25, which is the university-wide "activity time." Planning for the fall workshops was completed and advertised early in the summer to avoid conflicts with departmental meetings. Topics for the workshops included:

1. Using file servers and file maintenance

2. Using Lotus Email

3. Finding information with search engines

4. Creating a web site with Lotus Notes

5. A constructivist view of online interactions

6. Using scanners, digital cameras, and importing images into documents

7. PowerPoint and basic screen design principals

8. Using the Banner student information system

Based upon the topics, technology proficient faculty members were asked to conduct each of the workshops. Special care was taken to select faculty from each of the college's departments, not relying totally upon the instructional technology faculty. Workshop presenters were then asked to create a "fun" and "exciting" title for their workshop, such as: Clean up your mess! Using your server space for organizing, sharing and safekeeping your files. The title of each of the workshops, description, prerequisites, and what to bring were published in a six-page brochure and distributed to each of the faculty. Workshop presenters' e-mail addresses were included for workshop registration.

At the beginning-of-the-year meeting for the college of education, each of the workshop presenters gave a five-minute presentation highlighting his/her upcoming session. These light-hearted, yet technology and information-rich presentations created a high level of interest in the faculty, resulting in over-capacity attendance. During the workshop, attendees were presented with meaningful and relevant tasks which could be directly applied to their everyday duties.

Classes Offered at the FDI at Auburn University Montgomery

As noted, the classes that were offered at Auburn University Montgomery were based largely upon the perceived needs of the participants based upon the proposals submitted. The institute was held each Friday during Summer Quarter 1999. Classes were offered in PowerPoint, Basic HTML, WebCT (the majority of the institute was devoted to WebCT), copyright issues, using the distance learning classroom (two-way interactive audio/video), technology resources available on campus, educational issues related to the use of technology in the classroom, and, at the advanced level, JavaScript, developing streaming video content for web pages and mastering CD-ROMs. At the conclusion of the institute, a university-wide open session was held in which the participants could showcase the work they had accomplished during the summer. This mode of presentation allowed time for the participants to demonstrate what they had learned during the institute and provided additional advertisement for future institutes.

Problems Perceived and Overcome

At Auburn University Montgomery, during the initial planning stages, several faculty members commented that they had never, in the entire history of the university, seen the administration back so completely and so quickly the concept of the Faculty Development Institute. The initial funding, which included equipment to be used as servers, software licenses (primarily for both WebCT and Real Video), as well as monies to provide for the faculty release time, was quickly approved. Several committee members were allowed to visit and observe how other universities conducted similar faculty development programs. The quick turnaround time available from the initial call for proposals to the notification of the participants was a slight problem, which resulted, as noted above, a wide variety of the types of proposals submitted. The call for proposals for the Spring and Summer Quarter Faculty Development Institutes addressed that issue and provided a stronger guideline for prospective participants to follow and resulted in both a higher level of proposal and a much more consistent style of proposals from which to select the faculty participants. The reason all faculty who apply are not selected is primarily due to the funding needed for faculty release time. If funding is increased in the future, more faculty can be served. A primary problem that arose is one of equity of equipment across the campus. There were faculty who were using computers so old that they could not adequately access the Internet. We felt that we needed to show these faculty what they could do with adequate technology and attack the problem of finding this adequate technology at the same time. Fortunately, when the administration saw the level of enthusiasm and dedication from the participants of the institute, monies were found which allowed newer computers to be purchased for many of the faculty.

At Old Dominion University, although the workshops were endorsed by the dean of the college and were scheduled during the activity time well in advance, some meetings were scheduled which conflicted with workshop times. Interestingly, most of the conflicting meetings were scheduled by senior faculty members who had little or no interest in the technology workshops. In the future, ways must be found to ensure that such conflicts will not arise. The 55-minute time slot for the workshops was also problematic. Such a short time period was inadequate for most of the workshop topics. In the future, longer sessions will most likely be added, in addition to the 55-minute sessions.

The Evangelist and the Conscientious Objector - Lessons Learned from Faculty Development

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Abstract: This paper is a report of recent research that included such areas as faculty perceptions towards technology and progress towards integration of technology into teaching. Encouraging faculty participation and ownership of technology integration had both rewards and revelations. Three categories of technology adoption and integration were identified. It was found that encouraging faculty to implement technology in their teaching by providing equipment, training, and release time proved more beneficial than costly

Introduction

In fall of 1997, our college won a grant from a telecommunications and technology company that paid for some new desktop computers, software, projection machines, and most significantly, laptop computers for all faculty in the School of Education and Human Sciences. A crucial component of the grant was that faculty would integrate technology into their instruction in the classroom.

Design of Professional Development

Professional development opportunities were made available for all faculty members. The types of activities offered ranged from seminars to release time. Charter School faculty members have shown great resolve and initiative through their attendance at college-wide and school-wide seminars in technology that are offered by the Office of Academic Computing, Charter School, and Memorial Library. Charter School faculty are actively involved in researching the effects of technologically enhanced environments in the schools. Recent research has included such areas as faculty perceptions towards technology and the effects of multimedia technologies on the quality of classroom instruction. Several faculty were given release time to create technologically enriched environments for their classes.

Pitfalls and Epiphanies of Program Design

Encouraging faculty participation and ownership of technology integration had both rewards and revelations. The initial factor of access was addressed with assigning faculty members a notebook computer for their personal use. Notebook computer funding was grant based and therefore a one-time source of funds. The pitfall found here was related to funds to repair and replace equipment as well as provide notebook computers for new faculty positions. The rapid advances in technology itself also created a situation of functional obsolescence in the computers with no path (or funds) for upgrades. At the time of the initial purchase of notebook computers, the campus network infrastructure was rather fragile and would not easily support added devices nor allow any form of dialup access. This resulted in an appliance that faculty could not use for communication or research and therefore resulted in the notebook becoming a slideshow device. Network interfaces were eventually provided on a check-out basis for the notebook computers thus allowing email, network, and internet access.

Training opportunities were provided in operating system basics as well as application software basics. The initial training sessions were an addition to the existing teaching load and offered in lab environments. A technologist was also hired to work directly with faculty to learn and implement the new technology. In a campus-wide survey on technology, several faculty noted the additional time required to become adequately acquainted with the new toys, yet in every case, the faculty member noted that the time, effort, and "disequillibrium of learning a new way of thinking about learning" (as one professor put it), was worth the accrued benefits.

Following the initial training opportunities several faculty were given a reduction in teaching load to research and implement technology in their teaching. The research was guided by the question, "How does technology affect your area of expertise?" The participating faculty were asked to document their findings, integrate innovative technological applications in their courses, utilize technology in communications with students, and require students to use technological tools in fulfilling course requirements. Although reports from faculty varied widely, most agreed that the opportunity to focus upon technology for an entire semester gave them a chance to lay a foundation for future expansion of technologically-enriched teaching. On the negative side, faculty complaints centered upon equipment and specific software packages.

From an administrative viewpoint, encouraging faculty to implement technology in their teaching by providing a modicum of equipment, training, and release time proved both beneficial and costly. A grant was used to fund the initial technology and professional development. What occurred after the grant was a well justified demand for additional technology from the faculty. The notebook computer opened the classroom for technology integration and created a need for projection devices and network drops in all classrooms. Even though such expenditures were not initially anticipated, the momentum of the faculty made locating new funds absolutely essential. Although mining for dollars to fund projects is a tricky enterprise at best, the enthusiasm of faculty made the task tolerable.

Developments in Technology Uses

The faculty at the Charter School have enhanced many of their courses through technology so that prospective teachers systematically experience the power of digital and other technologies. A major focus of the ways that technology are integrated throughout the curriculum is to ensure that prospective teachers see these technologies being modeled by professors in the teacher education program. A second focus is to familiarize students with these technologies so that they are comfortable in using them in their own teaching. As evidenced by the high demand for projection devices in the building were education faculty teach, use of technology is a matter-of-course. In their assignments, faculty expect students to move beyond the "technology as toy" phase and become innovative producers and users of technology beyond the rudiments of course assignments. The faculty realize that students cannot create an effective cutting-edge lesson without first "seeing how it will fly" in a real classroom. Thus, through their progressively more intense field experiences, students learn to use what they have created in the computer lab in a classroom setting. In this manner, students move from learning about technologies to enhancing instruction through different kinds of technologies.

Categories of Technology Adoption

The levels of technology adoption and integration by the faculty can best be classified into three groups: Evangelist, Balanced, and Conscientious Objector. The evangelist group includes professors that have moved from little or no technology usage to full adoption, including many who insist on implementing some form of technological infusion in each class meeting. The following response in a recent survey of the faculty typifies this mode:

"I think students expect us to use technology as the main mode of instruction now. When we first were all using it, I think they were frustrated with us 'learning' on them! Now I feel funny if I don't use some form of technology in a class. The students appear to appreciate the note pages I hand out, so we can focus on the verbal information and interaction without having to worry about writing down every word. I'd like to infuse more technology with different types of software and applications that are used in the field."

Other "evangelists" have moved their course information to the web, taken technology leadership roles in national organizations, acted as technology consultants for international publications, and begun to share what they have discovered with other faculty. Some "evangelists" continue to seek new and innovative ways of utilizing technology by experimenting with technology as a matter of course in their teaching. For example, one professor who only two years ago pronounced himself a "neo-Luddite" has recently started an online magazine in his field and routinely requires students to read and report on breaking news via his personal message board.

The "balanced" group consists of professors who are comfortable with communicating with students and colleagues using email, searching various on-line databases for research, using some type of presentation software in their lectures, and feel that technology has helped improve their instruction. A survey response from this group stated that "even though the infusion of technology in upper-level classes required a great deal of time and energy, the benefits to the students outweighed the inconvenience."

The "conscientious objector" group was a small percentage of the faculty and could best be described as those that tried to incorporate technology and were not delighted with the time required to learn the new skills nor the results of their technological endeavors. Typical survey responses from this group were related to problems encountered with the equipment, how technology "distracted students," the lack of extended time for one-on-one training, and complaints related to technology services at the college. While the "conscientious objector" might rarely use technology, they did not actively attempt to dissuade other faculty from using technology. Like Bartleby the Scrivener, in regard to becoming technology users, they simply "preferred not to."

Implications for Faculty Development

To reach both the conscientious objector and the evangelist, a program of faculty development must be adaptable and appealing to a diverse group of professionals. Group instruction classes are the usual means for teaching new skills. This method may work well with the "balanced" group but is too limiting for the "evangelists" and too intimating for the "conscientious objectors". A move to individualized instruction is currently under study. This method will utilize both web resources as well as CD-based media. Such individualization would combine access to the college's central help desk with limited one-on-one personalized help from the school's instructional technology staff.

Infusion of technology into teaching requires a different kind of commitment. Because no one-size-fits-all technique exists to enable a faculty a member to comfortably plug technology into teaching, individual faculty must be allowed to research and observe exemplary teachers. While such programs can be found on campus, sometimes faculty are most comfortable leaving town for a few days to watch the different ways that faculty at other institutions employ technology in their teaching.

Perhaps the greatest epiphany of our three years of research is learning the importance of offering useful, welcoming, non-coercive faculty development. A serious commitment to ongoing faculty development is at least as critical to the integration of technology into instruction as providing the machines and the software.

PUZZLED BY TECHNOLOGY PROFESSIONAL DEVELOPMENT? WHICH PIECES FIT IN HIGHER EDUCATION?

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Abstract: The USE Tech Partners Program at West Chester University is geared toward full-scale integration of educational technology in teacher preparation. This program, funded by the U.S. Department of Education's "Preparing Tomorrow's Teachers To Use Technology" grant aims to promote effective technology use in a University–K-12 school partnership. The presentation highlights strategies that have been effective, lessons learned through implementation, and next steps in the project.

Introduction

An important goal for teacher preparation institutions in the first years of the 21st Century is to graduate teachers who can meet national standards of technology integration. To achieve this objective, colleges and universities must insure that their own teachers (i.e. professors) can model the kind of technology integration they want their students to replicate in K-12 classrooms. For many teacher preparation schools, finding feasible ways to help faculty become role models will be a challege: professional development resources are limited, faculty technology skills are just beginning to develop, technology integration at the university level is an unfamiliar concept, and personal incentives are uncertain.

However, driven by the realization that school districts will most quickly hire those candidates who are technology proficient and that the responsibility to educate students for a technological world cannot be ignored, higher education will find ways of addressing these professional development needs. Yet exactly how teacher preparation institutions can best provide the kind of professional development needed by faculty remains a puzzle. The USE Tech project is seeking to identify the pieces of that puzzle during its capacity building year.

Project Background

Undergraduate teacher education has been a primary mission of West Chester University (WCU) from its beginning in 1871. WCU now ranks as the third largest university in southeastern Pennsylvania and teacher education remains the most popular major for both undergraduate and graduate students. Over 600 teachers each year are graduated from WCU teacher-education programs. There are approximately 100 fulltime and adjunct faculty members within the School of Education. Additional faculty from the College of Arts and Sciences (CAS), School of Health Administration and School of Music also help prepare teachers.

At the beginning of the project, only a few teacher education professors were integrating technology into their courses on a regular basis. WCU received a grant from the *Preparing Tomorrow's Teachers to Use Technology* program funded by the U.S. Department of Education. One of the major goals of the project funded by that grant, the Use Tech Partnership Program, is the modeling of technology integration by WCU faculty in both methods and content area courses. To achieve this objective 16 faculty have been awarded released time during Spring semester 2000. These faculty members, with technology skills ranging from novice to advanced, have written proposals describing their plans for technology integration. These plans range from basic ideas such as putting lectures on PowerPoint or using e-mail with their classes to complex schemes for capturing instructional video that will be made into CD-ROMs.

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Professional Development Activities

West Chester University is addressing the professional development challenges presented by the needs of those faculty participating in the Use Tech project as well as other faculty who prepare teachers in several ways: by establishing a faculty technology center in the School of Education, as well as by providing skill training, assistance in integrating technology into specific courses, and supportive services.

Faculty Technology Center

Prior to the grant request for proposals, the WCU School of Education had established a Faculty Technology Center (FTC). The FTC loans equipment, provides a technology service, and conducts technology training. Knowledgeable staff from the FTC will assist professors in integrating technology in the specific courses they teach. Although there are other supportive technology services available from the university, the School of Education believes technology support available within their building and oriented toward the specific needs of an education faculty are integral to greater and timely technology integration in teacher preparation courses. The FTC maintains a room in which to conduct training and perform administrative functions.

Technology Skill Development

As part of the grant project, we plan ongoing professional development activities to prepare faculty to model technology integration in their own teaching. This will include both activities that develop technology skills and the ability to integrate technology into existing courses. Workshops and training sessions will be provided on the selection and use of software, the use of peripherals, the use of technology as a tool that focuses on extending thinking and learning skills in students, and the use of Internet resources. Additionally, faculty will explore the use of two-way video to increase connections to the K-12 community and to allow more opportunities for preservice teachers to practice teaching in an on-line environment.

Faculty will identify technology skill areas in which they need further development and training will be provided. Our initial plan is to feature the use of "just-in-time" support to address the immediate technology skill training needs of WCU faculty. Training activities will be ongoing throughout the project -- either one-on-one or in small groups.

Mentoring

Professional development research shows that peer coaching provides additional avenues for teachers to share expertise, perspectives and strategies with each other. Cohen, Talbert & McGlaughlin (1993) point out that "understanding how teachers respond to an ever-changing situation with knowledge that is contextual, interactive, and speculative." For this reason, we believe that faculty development programs should be structured around peer-coaching or mentoring in which the relationship between learner and coach is grounded in actual classroom practice. Learning new practices (such as technology integration), often involves changing old habits that have made teaching comfortable and predictable. A "buddy system" pairing a more experienced technology user with a novice will be established and should be especially helpful in the integration of technology in WCU classrooms.

Integration Strategies

In addition to on-going professional development offered through the FTC, a Technology Integration Institute is planned for the semester break between the Fall (1999) and the Spring (2000) semesters (January10-14, 2000). During this time faculty members will be given time, training, and support in a "How to Infuse Your Course with Technology" workshop. Professors will be asked to attend the conference with their course materials in hand and will be given technical assistance to take the necessary steps forward in becoming technology-integration models for our preservice teachers. Project staff, WCU faculty, and consultants from other universities will lead the institute. Planned events for this workshop include clarification of goals, development of standards by which faculty will measure their technology integration activities and improvements, and workshops on web page basics, creating an online course, and K-12 technology integration.

The 16 participating faculty with released time during Spring semester 2000 will develop and test integration strategies in one or more of their courses. As a result of their activities, the project will detail a set of promising strategies and activities for technology integration in the WCU School of Education and College of Arts and Sciences. We expect the faculty to describe how they use e-mail, the Internet and web-based learning applications, content specific software, and common software productivity tools such as word-processing, spreadsheets, databases, presentation software, and video-conferencing to enhance the learning of preservice teachers. Faculty will explain what strategies best support learning with technology in their courses. By the end of the year, we will have a model of ongoing professional development for technology integration.

Visits to K-12 Classrooms

In order to become role models of technology integration for the teachers they prepare; university faculty must be knowledgeable regarding the use of technology in K-12 schools. After identifying master teachers who are able to serve as exemplary models for technology integration in K-12 schools, faculty will visit their classrooms either in person or via two-way video.

Communication of Successful Activities

A project web page will communicate project activities including preservice teacher technology competencies and strategies and activities for integrating technology into the teacher preparation program. This source of on-going development and communication will become important to the continued success of WCU technology integration as more of our work becomes web-enabled or web based for distance education purposes. By the end of the year, this project web site will post the work of this initiative to the participants or others interested in teacher preparation throughout the world. As a result of this activity, we expect to learn from colleagues who have common interests. Perhaps, through collaboration with others, we will identify enough of the pieces of the higher education professional development puzzle to realize our goal of enabling faculty to become technology-proficient role models.

Lessons Learned about Professional Development

The evaluation for this project will be a formative one. The purpose of the evaluation is to provide information that can help identify any problems and improve project design and management during our capacity building year. With such information in hand, we can adjust project plans for the implementation phase. Since we will focus during our capacity building year mainly on training faculty and developing integration strategies, the evaluation will focus on this emphasis. Key to the formative process will be a systematic effort to document and learn from the ongoing project activities to better understand faculty needs and identify the strategies, which meet them.

While the project is still in its initial stages we are beginning to receive feedback from working with the participants.

- Faculty members have different parts of a shared vision for technology integration and need time to share these ideas with one another. Hearing the same story from the same person in the same way can inspire not all.
- Released time from a course for the specific purpose of improving technology skills and integration of technology into their courses is a good incentive for faculty. Faculty appreciate the time allocated for their own development.

- Faculty can become more interested in technology use when they see their own students modeling technology use in the course they teach. Making technology accessible to students for the purpose of class presentations enables their professors to see how technology might be used.
- Easy access to technology when and where it is needed is very important for higher education faculty. Requirements for advanced planning, complicated sign out systems or movement of equipment from floor to floor creates barrier to use.

Next Steps for the USE Tech Partners Program

We are still in the in the early stages of our project and much remains to be done. During Spring semester, 16 faculty members with reduced course loads will have the time to integrate technology into their courses. The project will support efforts at continuous improvement as they use ISTE/NCATE standards as a guide for their technology integration. Future plans include a scaled-up effort with additional faulty becoming involved and additional activities with K-12 schools that will include both preservice and inservice teachers.

Aids and Cautions for Developers of Web Pages to Supplement Courses in Higher Education

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Abstract: This paper presents a number of problems commonly found in web pages intended to supplement traditional courses in higher education. These technical and content problems limit the usefulness of such pages, and frustrate both students and instructors. The solutions to these problems are simple and can be implemented by any instructor. Some require an elementary knowledge of hypertext markup language (HTML), while others require only an awareness of how common pitfalls can be avoided.

Introduction

The World Wide Web has become ubiquitous in nearly every walk of modern life. An index of the unprecedented growth in size and popularity of the web is the fact that there were fewer than 50 web pages in existence when President Clinton took office. Today, of course, there are literally hundreds of millions of pages, and an early study of popular use patterns revealed that in the first three months of 1995, Internet users spent more time surfing the web than the total combined playback time of all rented videos in the United States and Canada (Masotto 1995)!

Not surprisingly, the web is transformingdiverse elements of our culture, including education. One of the earliest educational movements to be affected was distance education. Only a few years ago, distance education around the world was centered on audio signals, closed circuit television, and videotape. Today, colleges and universities around the world are offering web-based undergraduate and graduate degrees of all types and descriptions. In the future, as web-based, multimedia technologies evolve and improve, distance education will continue to expand its involvement with the web.

Perhaps in the future, there will be web style and design standards that are well-thought-out and widely-accepted. However, no such standards exist today. Consequently, the quality of web pages varies greatly, and the state of the art in education related web pages could justifiably be termed chaotic.. This is true for pages of all types, including (or especially) those associated with higher education courses.

There are two general types of web pages associated with higher education. The first type is more highly developed than the second type, and consists of those pages that are part of higher education courses that are delivered to students completely electronically. These pages are, in general, of higher quality than those associated with the second type, which are those intended to be supplementary to traditional courses.

The reason that many pages for use in totally distance-delivered courses are superior to those that are supplementary to traditional classes, is that many institutions employ both technical and pedagogical experts to help develop such pages. Although such experts do not

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always produce excellent pages, either technical or pedagogical, they do often avoid some of the more obvious problems that novice developers frequently make. Individual professors, on the other hand, frequently do not have either the time or the expertise needed to produce even minimally competent pages, and their institutions often provide little if any technical support to help them do so. Consequently, many supplementary web pages are of such poor quality that they are of little use to students, and some are so crudely done that they represent student liabilities rather than assets.

The purpose of the present paper is to present a variety of aids and cautions for developers of web pages that are intended to be supplementary to traditional courses.

Some Common Web Problems and Some Easy Solutions

The widespread availability of HTML editors and translators, together with the lack of institutional support to help instructors develop supplementary pages has resulted in many pages that have been designed and developed without even cursory expertise in HTML (hypertext markup language). Consequently, there are serious technical problems with many web pages.

Many pages lack TITLE tags (a descriptive title located between <TITLE> and </TITLE> in the code for the page). This omission results in popular search engines and directories listing these pages as "UNTITLED" or with titles that are incorrect or misleading.

Other pages lack META tags (tags containing a brief narrative description and list of keywords for use by search engines and directories). This may cause search engines and directories to list such pages in the wrong categories, or to provide descriptions that are not accurate.

Much of the growth and popularity of the web is probably due to the ability of modern browsers to display graphics. However, many pages do not make judicious use of graphics. Developers should remember that many students are equipped with slow, obsolete modems, and even up-to-date, fast modems will be slowed unacceptably by the overuse of graphics. However, good HTML and a little common sense in the choice of graphics can overcome the problem of pages that load too slowly due to graphics problems.

Developers should keep in mind that once an an image has been loaded into a user's browser, it can be used again on that page without reloading time. Therefore, horizontal divider bars and other incidental graphics should be reused whenever possible.

Developers should also take care to include the pixel height and width of all graphics in the image source tag for the page (An example using a graphics file named "bar.gif" might be <IMG SRC="bar.gif" HEIGHT=10 WIDTH=200>). Defining the height and width in this manner will allow each graphic to display as it is loaded, thus providing something for users to see immediately. A lack of height and width specifications will cause the browser to display a blank page until all graphics are loaded.

Then too, the HTML code should make use of the ALT attribute to specify a text description of each graphic for display in case the user views the page with a browser that is not capable of displaying graphics, or in case the user has turned off the browser's graphics display capability in order to speed loading. (The example above might be <IMG SRC="bar.gif" HEIGHT=10 WIDTH=200 ALT="Blue dividing line">

Large images can take several minutes to load, especially by outdated modems. Therefore, large images should always be preceded by small, "thumbnail" images that will

load quickly because of their small size. Then, users who wish to view the large image can click on the thumbnail, and other users are spared the necessity to wait for these images to load. Developers should display the size of the full image below the thumbnail link, so that potential viewers can decide for themselves whether or not the full image is worth the wait.

Web pages should never make use of graphics that must be loaded from another site. Instead, all graphics should be copied and stored in the same place as the files that make use of them. Loading graphics from a different site slows loading unacceptably. Then too, the owner of the site from which the graphic must be downloaded will not appreciate a "hit" on that site every time anyone on the web views any page containing the image. Many graphics sites on the web have been removed or a password system instituted because repeated hits caused by this practice have brought the server down or slowed it unacceptably. (Of course, before copying and displaying any image, developers should make sure that the image is in the public domain, or that the owner has given permission for its use.)

"Imagemaps" (special areas of a graphic that function as links) should be used sparingly, and there should always be alternative, text-based links available. Developers should keep in mind that many students are not highly skilled web users, and some may not realize that areas of graphics can be made to function as links.

Developers should avoid the use of "frames" (an HTML strategy for dividing the browser window into separate displays or windows.) Frames present a number of user problems that can be highly frustrating to students who are web novices. Such students often do not understand that bookmarking a page located in a frame merely stores the frame definition page, rather than the page to which they wish to return. Thus, they may find themselves searching repeatedly for pages they erroneously believe they have already bookmarked. Then too, incompetent HTML frames code can cause any page viewed subsequent to viewing a frames page to appear in a frame within a frame. Novice users are often frustrated by this problem. (Developers should consider the use of HTML tables rather than frames for most uses that require distinct areas featuring separate displays.) If frames are used, the HTML should be written to provide a link to the same material in nonframes format.

Every page should contain a link to the e-mail address of the person or persons to whom problems and suggestions should be reported. Such links should display the full e-mail address, in case users do not have browsers that are properly configured to automatically open blank e-mail messages when such links are chosen. Such users can then copy the e-mail address for use later when they have opened their chosen e-mail application. (An example of code to display a link to the author's e-mail is: <"mailto:maddux@unr.edu">maddux@unr.edu</A>.)

Every page should contain a link at the bottom that will return the user to the top of that page, and to the site "home page." (The home page is the first page that the developer wishes users to view.) A link to the top of the current page saves the user from the necessity to scroll to the top of the page. A link to the home page is necessary to avoid another surprisingly common and frustrating problem - the problem of failing to fully and properly identify pages. It is essential that developers take care to identify institutional and departmental sponsorship of pages. Such identification of sponsorship should be complete and should not involve abbreviations or acronyms of any kind. However, an almost unbelievable number of higher education (and other) web pages contain no identification whatsoever! This often happens because the developer of a given page erroneously assumes

that the page will be found only by those who follow a link found on one of the developer's other pages. However, most pages are not found by "surfing." Instead, most are found by users who type a search string into one of the many popular web search engines or directories. (Search engines are large, automated databases that attempt to include all pages on the web, while directories are smaller databases that include only those pages that have been viewed and categorized by human workers.) Consequently, all pages should be self-contained with respect to identification of institutional and departmental sponsorship. The full names of all institutions and departments should be spelled out at the top of the page, and complete addresses provided. More and more institutions have developed style manuals for use on all official pages, and developers should check to see if such a manual is available. In the absence of an institutional requirement, developers should also include a "footer" at the bottom of every page. This footer should contain an identifier, a link to the institution's home page, a statement as to when the page was last revised, the full URL of the page, and a link to the e-mail of the developer of the page.

Many course pages do not contain a link back to the home page (the "home page" is the first page of a series of pages at a web site). Pages with no link back to the home page are web "dead ends." Viewers of such pages are often unable to locate the home page for the site, particularly if the site does not contain proper identifiers. Again, this problem may be due to web page developers incorrectly assuming that all users will arrive at each of their pages by choosing links located on one of their other pages. Such users who have chosen a link on the site home page can return to that page by clicking on the "back" button of their web browser. However, users who found the page through use of a search engine or directory, and who wish to view the site home page, will be able to do so only if the developer has placed a link to the home page on every one of the site pages.

Many supplementary course pages contain lists of links to other sites that deal with course content. Such links can be extremely helpful to students who wish to view more complex information on a topic, or who need a different approach to the same material. However, many course pages contain links that are no longer active and that produce error messages when they are chosen. This can be highly frustrating to students and may cause many of them to ignore all links provided by their instructor. All links should be checked frequently - probably at least weekly to make sure that they are still functional. "Dead links" should be removed or brought up to date.

Every page at a site should begin with a short statement of the purpose of that page. This will assist the developer in keeping the proper focus as the page is developed. Then too, it will assist students who are looking for the page on the site that contains specific information.

Pages should not be too lengthy. At most, there should be two to three screens of information. If more lengthy information needs to be included, it should be broken into smaller "chunks" and placed on one or more linked pages.

The content of supplementary web pages is also of obvious importance. A recent informal survey of several hundred students in the author's department revealed that students most want lecture notes to be available on the web. Such notes need to appear soon after each lecture, ideally within 24 hours. Students also want full syllabi including grading policies and criteria, a course calendar, and the ability to download all handouts given during class.

Many course pages show inadequate attention to the mechanics of writing. Spelling, punctuation, and grammar should be meticulously checked for accuracy. There is no excuse for educational pages that provide poor models of such mechanics.

Developers should also take care to view their pages in more than one browser. At a minimum, Netscape and Internet Explorer should be used to preview pages. Every browser is slightly different in the way it displays certain elements of HTML. Therefore, developers need to ensure that the page is acceptable when viewed with these two browsers.

Conclusions

Web pages that are supplementary to traditional courses can be highly beneficial to both students and instructors. However, the web is full of pages with serious problems that limit their usefulness. Many of these problems are easy to rectify. This paper has provided a discussion of some of these common problems together with some suggested solutions. For a complete discussion of these and other recommendations, readers are referred to Maddux and Johnson (1997).

References

Maddux, C.D. & Johnson, D.L. (1997). The World Wide Web: History, cultural context, and a manual for developers of education information-based web sites. *Educational Technology*, 37 (5), 5-12.

Masotto, T. (1995). *CommerceNet/Neilsen Internet demographics survey executive summary* [Web document]. URL http://www.commerce.net/work/pilot/nielsen_96/exec_95.html.

Power Web Searching Techniques for Teacher Educators

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Abstract: Examination of new search tools and techniques that teacher educators can use to improve the efficiency and effectiveness of their own web searching. Techniques to be presented include use of metasearch tools, improving relevance rankings with search engines, backwards searching, searching the invisible web, and use of kids' search tools.

Introduction

Showing students great curriculum-related web resources is a popular activity in many teacher education courses at both the graduate and undergraduate level. Not only does this allow faculty to model the integration of technology into the curriculum, it also gets students excited about the new kinds of resources available. But is it enough? As E.M. Forster said, "Spoon feeding in the long run teaches us nothing but the shape of the spoon." Knowing how to search for web-based information is the critical skill. Unfortunately, searching for web-based information can be a frustrating and time-consuming experience. This paper identifies new search tools and techniques that can be demonstrated to students to improve the efficiency and effectiveness of their searches. Five specific techniques will be highlighted: using metasearch tools to improve the comprehensiveness of web searches, improving search relevance with search engines, backward searching, searching the "invisible web", and using kids' search tools to identify developmentally appropriate resources.

Comprehensive searching with metasearch tools

A recent article in *Nature* (July 8, 1999) by Steve Lawrence and C. Lee Giles received wide attention in the press. Lawrence and Giles examined the World Wide Web in February 1999 and found that publicly indexed web pages had increased to 800 million (up from an estimated 320 million in December 1997). Their article analyzed how well eleven search engines/directories performed in accessing the information contained in those 800 million pages. Lawrence and Giles estimated that the combined coverage of the 11 tools was only 42% of the total web and that the overlap among the search engines was surprisingly low. This research implies that using multiple search engines is a necessity today. Metasearch tools allow us to do just that -- quickly and effectively. Metasearch tools that will be demonstrated include ProFusion (http://www.profusion.com), Metacrawler (http://www.metacrawler.com) and SavvySearch (http://www.savvysearch.com).

Improving search relevance with search engines

Most of us probably have a favorite search tool, such as Yahoo!, Infoseek, or Excite, and there is certainly something to be said for developing a high degree of familiarity with the search features of a single search engine or directory. However, in the rapidly changing world of the web, it is important to be aware of new search tools and the features that they use to try to improve the relevance of results. New search algorithms are developed regularly, usually in conjunction with a new search service.

Google (http://www.google.com) is one of the most exciting search tools available today. Google's search algorithm is based on an approach called PageRank. The FAQ states that, "PageRank capitalizes on the uniquely democratic characteristic of the web by using its vast link structure as an organizational tool. In essence, Google interprets a link from page A to page B as a vote, by page A, for page B. Google assesses a page's importance by the votes it receives. But Google looks at more than sheer volume of votes, or links; it also analyzes the page that casts the vote. Votes cast by pages that are themselves "important" weigh more heavily and help to make other pages "important" (available online at http://www.google.com/why_use.html). Google allows users to capitalize on this by choosing an "I'm feeling lucky" button. When this button is chosen the user is directly linked to the page Google identifies as the most relevant. A search limited to United States government sites is also available through Google.

While Surf Fast (http://www.surffast.com) isn't based on a new searching algorithm, it does provide "one stop shopping" for web searchers. This well organized page provides keyword searching for all of the major search engines, plus quick access to major news organizations and other useful web resources such as Mapquest and Travelocity. Surf Fast can help students understand how important it is to match the

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kind of information needed to the search tool. Making this match is crucial in improving search relevance. Search Engine Guide (http://www.searchengineguide.com/) offers similar access to thousands of specialized search engines.

Backward searching

Chris Sherman suggests the term "backward searching" for the technique of using the "link" operator to identify pages linked to the URL that you have entered (http://websearch.about.com/library/weekly/aa082499.htm). The basic idea is that people only add links to sites that they consider highly relevant, although searchers still need to determine whether or not popularity actually equals quality. Backward searching is done using a link operator. Queries are usually structured like this: +link:URL. To assess quality, look over the list of "linking" URLs. Are all of the links from individual pages or are the links from well respected sites like Kathy Schrock's Guide for Educators (http://school.discovery.com/schrockguide/index.html) or the Librarian's Index to the Internet (http://sunsite.berkeley.edu/InternetIndex/)? If you find a promising page and you follow these "backward" links, you get a sense of whether others find the page so useful that they link to it. Backward searching is just one of the many power search tools educators can utilize once they become aware of the advanced search features included in different search engines. Unfortunately it can be a challenge to locate information about using advanced search features. At Infoseek you have to choose advanced search then choose help before you come to this information (http://infoseek.go.com/find?pg=advanced_www.html&ud9=advanced_www).

Searching the "invisible web"

Many resources that are very useful and relevant to teacher education cannot be retrieved using standard web search tools. ERIC, online library catalogs, and archival resources, are examples of resources that are simply not retrieved by the spiders and bots used to build search engine databases. If you have ever spent hours fruitlessly searching for information you're sure is accessible electronically, the information is probably "hidden" on the invisible web. And if students tell you that they couldn't find *even one article* on a common educational topic, they have probably been doing a web search, not searching in a specialized database. Students often do not understand the difference between information on web pages and information found in databases and indexes. Identifying places to search for these "invisible" resources is one step toward developing this understanding.

Direct Search (http://gwis2.circ.gwu.edu/~gprice/direct.htm) is a comprehensive index maintained by Gary Price at George Washington University. Direct Search provides links to a variety of education

specific resources, plus general interest resources including Your Nation (which uses data from the CIA World Fact Book to create customized, comparative statistical profiles for different countries), Termium Plus (billed as the definitive French-English dictionary), and the Writer's Guidelines Database. Lycos provides access to over 300 searchable education databases at http://dir.lycos.com/Reference/Searchable_Databases/Education/. Infomine (http://infomine.ucr.edu/) permits multiple database searching, which is a significant time saver, and it also has two long lists of instructional resource databases (for K-12 and for higher education).

Using kids' search tools

Another common task for teachers and teacher educators is to locate developmentally appropriate resources on curriculum-related topics. One strategy is to design a Boolean query such as "lesson plans AND nutrition AND third grade" and then to try the search with a general search engine. It may be far more efficient to search using kids' search tools. These search tools are directories of resources that have been carefully reviewed and evaluated for accuracy and age-appropriateness. Three examples will be demonstrated: ALFY (http://www.alfy.com), a totally icon-driven search tool designed for pre-readers, Searchopolis (http://www.searchopolis.com), an excellent search tool for elementary and middle grades students, and the Britannica Internet Guide (http://www.britannica.com), which is very useful for high school students. These well organized sites almost always identify relevant sites on the topics commonly taught in K-12 schools. As an added benefit, when students become comfortable with these specialized search tools they will be more inclined to let their own students begin to search the web.

Web searching is a complex activity that requires a considerable amount of knowledge and critical thinking. Learning about new search tools and search strategies that allow teachers to focus on the task and not the tool are important skills.

Interactive PowerPoint for Teachers and Students

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Abstract: PowerPoint has become more than a linear presentation tool. The later versions of PowerPoint support branching navigation, custom buttons and menus. These features make a powerful and flexible product for creating custom lessons. In addition, a PowerPoint show can include Web links, and a variety of files created in other programs. PowerPoint has also streamlined the process of designing for the Web. When using presentation software in the classroom it can be applied for education in three general formats: Teacher to Audience; Teacher to Individual; Student to Audience, depending on the structure of the presentation. Additional two types of interactivity that can be included in any PowerPoint presentation are navigation and feedback. When creating PowerPoint presentation, design considerations should be followed concerning number of items/points, font size, and color applications. Additional the use of multimedia (such as sound, images, and video) is an excellent way to enhance a presentation.

The Presentation

PowerPoint has become much more than a linear presentation tool. The 97 and later versions of PowerPoint support branching navigation, including custom buttons and menus. These features make PowerPoint a powerful and flexible product for creating custom lessons. This tool is useful as an automated kiosk, or as an individualized tutor. It is easier than ever to incorporate multimedia elements such as sound, graphics, animation, photos, and movies into the show. In addition, a PowerPoint show can include Web links, and a variety of files created in other programs. Databases, spreadsheets, and charts are a few examples. Now PowerPoint streamlines the process of designing for the Web, when presentations are saved as HTML files.

Presentation software, such as PowerPoint, can be used for education in three general formats:

1. Teacher to Audience
2. Teacher to Individual
3. Student to Audience

Teacher to Audience presentations involve the teacher, as presenter, sharing information with a class or group, in the classroom or even across the web. A presentation can be used to do more than just transmit information. Other applications include brainstorming, organizing, and reviewing. Benefits of interactive presentations include sensory engagement through multimedia, and easy reuse and updating of saved files.

Teacher to Individual presentations are often delivered by way of a hands-on computer station. Here students or small groups can work on tutorials, interactive lessons with feedback, review, and even testing. Using this approach students, can work at their own pace, and can experience individual remediation or enrichment. This type of program can be run in a computer lab, through a school's network, or via the World Wide Web.

Student to Audience presentations allow a student or group of students to share their learning with their class, their parents, their community, and even the world. By developing a

presentation, students gain extensive experience with organizing information, and they experience the real-world task of communicating knowledge to others.

Design Basics

When creating PowerPoint shows, some design considerations should be kept in mind. These characteristics will make presentations easier to comprehend and make the presenter appear more professional. First, on any slide it's best to use a maximum of six text items as phrases or bullet points. Any more than will cause the text to be too small and to present so many points that it is hard for the audience to keep in mind. With more than five or six points, consider grouping them into subtopics, then present the list for each subtopic as its own side. For purposes of presentation, it is recommended to use clean fonts and large font sizes. Avoid using decorative letter fonts, and instead use the classic Arial or Roman font types. When presenting, a 20-36 point font size is effective for distance reading. Avoid writing in all upper case, even for titles. The shape of a word can make it much easier to decode, and all caps cause all of the words to have the same block shape. Also, since web use has become very common, be sparing in your use of the underline and limit it to URLs and references only. Always choose a few high-contrast colors for the presentation: too many colors can become confusing, and a lack of contrast between the text and background can render the presentation unreadable. While people prefer to read dark text on a light background, light text and dark backgrounds are also acceptable. Ensure that the contrast is sufficient. Finally, consistently test the display of the presentation, along with testing microphones, speakers or any other associated equipment that is needed.

Multimedia

Visual media are extremely effective in education, and their proponents claim that they have great potential for further affecting learning. Many consider that visual media (including audiovisual) hold the greatest hope for the future of education. Regarding the use of multimedia including visual based media Barron and Orwig (1993) discussed reports that the use of multisensory delivery methods are more appropriate than single sense methods as some learners learn better under specific modalities. Since the use of multimedia provides instruction that is delivered to the student through numerous sensory channels, it allows for students of various learning styles to benefit. Others also support this viewpoint by suggesting that the educational setting should be providing a multi-disciplinary approach. In a large review summarizing methods for improving interest in the classroom, Bonwell and Eison (1991), state that the use of visual-based instruction, coupled with opportunities for responses from students, produced significant positive changes in students' attitudes. A multimedia presentation approach can involve the use of a variety of technological components such as video, audio, imaging, and other such materials. Use of multi-sensory multimedia approaches in the classroom has been shown to improve student learning. Studies also seem to indicate that the use of images and video in a presentation presents material within a framework that promotes better recall (Beaver, 1995).

The use of multimedia is an excellent way to enhance a presentation. Use graphics, sound, video, animation, and charts to emphasize the message. Whenever possible, keep multimedia files small, since they will have to load into the presentation computer's RAM before being displayed, and therefore may cause delays or pauses in the presentation. Don't include picture or sounds without purpose. An image or sound that has no bearing on the presentation can often be confusing or distracting. Avoid using repetitive sounds. A short tone is usually acceptable, but something longer that repeats often can be disruptive and distracting.

Multimedia Examples for Inclusion

- Virtual field trips
- Displaying items students need to recognize
- Displaying photos of student performances
- Simulations of processes or events

- Stills from movies
- Scans of documents
- Views through lenses
- Spoken instructions
- Reinforcing feedback
- Vocabulary pronunciation

Interactive Presentations

Educators such as Chickering and Gamson (1987) have stated that "learning is not a spectator sport. Students do not learn much just by sitting in class listening to teachers, memorizing prepackaged assignments, and spitting out answers." In active learning, students must talk, write, and relate to what they are learning. Overall, a need exists for a modification to the lecture, which has been the historic standard for instruction. Bonwell and Eison (1991) made the point, in their monograph summary of active learning at the higher level, that a major failing point of the traditional lecture is that students remember material presented at the beginning of a lecture better than information presented at the middle or the end. This result means that large amounts of information presented to the students are being lost. To overcome this loss and make instruction better, many are suggesting a shift from the basic lecture to a presentation that is more interactive in its approach. Meyers (1993) considered that active learning derives from two basic assumptions: (1) that learning is by nature an active endeavor, and (2) that different people learn in different ways. Others consider that, simply put, active learning is more likely to take place when students are not only listening; but are also engaged in activities. Students must do more than just listen in active learning: they must be engaged. According to Sims (1985), activities requiring active participation were found to be associated with higher levels of attention than were more passive types of activities. All of these results lend credence to the inclusion of interactivity into presentations.

A method that has been found to be effective in teaching is to shift from a lecture format to one of active learning, where the student has some level of interactivity with the material being presented. Two very easy types of interactivity that can be included in any PowerPoint presentation are navigation and feedback. For navigation, use onscreen buttons and hypertext for a branching structure, allowing the user to visit the sections as they wish or to provide the option to gain more information on topics of interest. For feedback, slides can present questions and offer choices of answers. With proper scripting, when students make choices they are either given feedback on the slide or are taken to new slides that provide information. Benefits for the user of this structure include increased engagement, control, and interest along with immediate response.

A teacher can go even further with interactivity with the use of Visual Basic for Applications (VBA). With VBA, it is possible for a PowerPoint presentation to not only ask and evaluate questions, but also track responses, store information, provide feedback, and generate reports.

How to add interactivity with buttons for navigation or answers:

4. From the Slide Show Menu choose Action Buttons
5. Select button appearance
6. Then choose the action for the button
7. Locate and size button on slide
8. Double-click button to change color
9. Right-click on the button to add text or change action

How to add interactivity through hypertext for menus and links:

10. Highlight text
11. Right-click the selected text to choose Action Settings
12. Select an action for the text, such as:
    link to another slide
    link to another PowerPoint
    open a file

open a specific web page (URL)
run a program
run a macro (or VBA application)
play a sound or video

PowerPoint is capable of more than a linear presentation. By including branching, relative navigation, custom buttons and menus, you can make PowerPoint become so much more than just a presentation application. Understanding how and when to incorporate multimedia elements (sound, graphics, animation, photos, and movies) creates a more interesting and effective presentation. Through the application of Web links, and files created in other programs, information presented in PowerPoint becomes much more dynamic and current.

References:

Barron, A. and Orwig, G. (1993). *New Technologies for Education: A Beginner's Guide*. Englewood, Colorado: Libraries Unlimited, Inc.

Beaver, P. (1995). "*Memory for Dialogue: Recalling an Anchor through Talk and Response*." Paper presented at Annual Meeting of the American Educational Research Association, 1995. ERIC Document ED392266.

Bonwell, C. and Eison, J. (1991). *Active Learning: Creating Excitement in the Classroom*. ASHE-ERIC Higher Education Report No. 1. Washington DC: The George Washington University, School of Education and Human Development.

Chickering, A. and Gamson, Z. (1987). "Seven Principles for Good Practice." *AAHE Bulletin* 39. ED 282-491.

Meyers, C. (1993). *Promoting active learning: strategies for the college classroom*. San Francisco, California. Jossey-Bass Inc., Publishers.

Sims. W. (1985). The effect of high versus low teacher affect and passive versus active student activity during music listening on preschool children's attention, piece preference, time spent listening, and piece recognition. *Journal of Research in Music Education, December 1985*. 173-191.

Networked Software Support of Staff Development.

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Abstract: We have developed a searchable on-line database of staff development material relating to electronic teaching resources, which operates across the University network. The database is searchable via a simple interface and offers staff with little experience of computing the ability to locate general or subject specific information and then use the resource directly using a simple point and click procedure. This facilitates the distribution of information via a one to many approach and eliminates the redundancy inherent in personalized data mining. The database contains a pool of local resource material, which can be shared between teaching staff. Each item of material is catalogued according to predefined search terms, and single database field allows web links, shortcuts, images and program links to be "dropped" into it. Such an approach makes the database a more personalized information delivery mechanism.

Introduction

The major reasons why the use of computers to deliver teaching material is not more common in university education are well documented but have not yet been fully addressed at least within the United Kingdom. There is a significant lack of knowledge on the part of academic staff as to the pedagogical and technological changes which computers bring to higher education. There is an urgent need at least within the UK for staff development programs that can provide information on this subject and can hasten the management of these changes. Information on, and access to such programs must in our opinion be available from the user's desktop and must take cognizance of an individuals computer skills, teaching style and lecture content.

While the WWW is in theory the obvious delivery mechanism for such information, in its current state it has three restrictions when considered for this task. Firstly the teacher entering this field for the first time will need to acquire information on topics relating to both the teaching/pedagogical role of computers and then to his or her subject specific material. The organization, grouping and indexing of this material can be done in a limited way using the "bookmark" approach, but rapid retrieval of such relatively unstructured information demands some skill and commitment from staff. Secondly, many examples of for example interactive software need to be demonstrated locally and in a manner which allows a high degree of user interactivity. To convince staff that for example a simulator program may be a useful teaching tool needs more than an interactive web page demanding a plugin the user may not have or may not understand how to use. Finally the web approach does not facilitate the sharing of resources and information in the same immediate manner as for example a LAN based application. The situation is changing rapidly and the wider introduction of databases using the web as a query and delivery mechanism will improve information flow. However, we feel there is still a place for a computer program which presents a structured, user friendly approach to the dissemination of validated resources and allows their immediate on-line execution.

We have developed software which combines what we feel is the best of these two approaches. We use a server-based database to collate/index/ and present a simple search interface to staff. The database stores web links, links to server based demonstrations of interactive CAL, non-copyright images, sound and video files, rich text formatted information and links to examples of spreadsheet, presentation and database material. This allows any member of staff to profit from the data mining of another and to share resources.

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The program is essentially a word processor/database into which active links can be pasted, grouped where required and indexed. Formatted text on a particular subject can be displayed within a record together with "shortcut links" to relevant web sites, documents, images, etc. As a staff development tool this allows us to deliver a coherent collection of several information resources relating to information on a single subject. Random browsing of the web by staff is reduced since if for example they require information on for example "Computer Adaptive Assessment" they simple key in the phrase and ALL the material which ourselves AND their colleagues have previously researched and entered into the database is available to them.

Operating across the network, staff can either run or download the material. Image files, presentations etc. can be is linked to the staff member who produced them and thus staff can communicate with colleagues if they wish to borrow material for teaching.

We feel that until the use of web –driven database's are common and more staff have a higher degree of skill at downloading and installing software, the opportunity for them to browse or search through a comprehensive database of information will be a valuable asset to our staff development program.

Teacher Educators' Reflections on Using Group Response Technology

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Abstract: The study reported in this paper explored the use of group response technology (GRT) by teacher educators and their reflections on the use of the system with preservice teachers. Five teacher educators used GRT with undergraduate students and then reflected on how the system impacted student participation, class discussions, and instructional planning. Data for the study consisted of instructor interviews. The results suggest that GRT was an efficient means for all students to participate in class and for the instructor to monitor student progress during instruction.

Background

Recent federal initiatives call for the development of teachers who can meaningfully use technology to help students learn (U.S. Department of Education, 1999). Unlike instructional technology diffusion efforts of the past, the focus of the current initiatives is to prepare teachers who understand both the technology and pedagogy and can effectively integrate the two to create learning environments where K-12 students use technology to make meaning. Toward this aim, current initiatives integrally involve teacher educators from all disciplines and not just those in instructional technology. Moreover, current initiatives call for the regular integration of the technology into the teaching and learning activities of all aspects of teacher preparation (U.S. Department of Education, 1999).

In our efforts to move beyond using technology primarily to supplement instruction, we need to develop technology applications that that help solve current challenges in teacher education. One challenge in teacher education is the need to enable active student participation across large groups of students and provide efficient instructor access to student knowledge during instruction. The typical mode of instruction for large groups is lecture (Benjamin, 1991). Although lecturing may be an efficient means of information

dissemination, student participation is passive, at best. Another challenge is the absence of efficient means for instructors to monitor student progress during instruction. Instructors' questions in large classes generally are rhetorical or answered by only a few students. Even if the instructor receives input from some students, it is still difficult to efficiently monitor all students' progress during instruction.

In teacher education, the challenge of creating participatory learning environments and facilitating instructor monitoring is greater because the implications of not doing so are far reaching. Because teachers tend to teach the way they were taught (Lortie, 1975), it is imperative that preservice teachers learn about teaching in cognitively engaging environments where they are active participants.

Group Response Technology

To more fully engage all students during group instruction and provide an efficient means for instructors to monitor student progress, we explored the potential of group response technology (GRT) to support teacher education. GRT is one form of groupware that has potential to enhance the effectiveness of lecture-based instruction (Foegen & Hargrave, 1999). GRT supports efficient communication within a group by collecting input simultaneously from each group member; furthermore, that input can be accessed and reviewed by a single user (Foegen & Hargrave, 1999). Common examples of GRT include audience response systems used in the marketing and entertainment industries.

The GRT system used in our investigation was Discourse®. Discourse, which consists of individual student terminals networked to a teacher's workstation, is a text-based response system that allows students to respond in phrases, complete sentences or even paragraphs. Discourse enables the instructor to obtain feedback during instruction from each student in the class about course content (see Foegen & Hargrave, 1997; Robinson, 1994). The purpose of this article is to describe how teacher education faculty used GRT and their reflections on their use of the system.

Method

Our study examined the perceptions of instructors at a large, Midwestern university as they learned to use Discourse and incorporate it into an undergraduate course. This system was housed in a model "technology classroom" and was supported by a quarter time graduate assistant. During the 1998 fall semester, we recruited seven instructors to participate in the project. Interview data for five of these instructors formed the data set for this study. These instructors (four females, one male) taught a variety of courses ranging from a sophomore level introduction to teaching strategies course to a senior level student teaching seminar. All had graduate degrees (2 doctorates, 3 masters degrees), and each had taught their respective courses during previous semesters. Additional information about the instructors' courses and use of the GRT are presented in Table 1.

Late in the 1998 fall semester, the instructors participated in a Discourse training session. During this 90-minute session, instructors experienced (from the student perspective) several different models for integrating GRT into instruction (e.g., large group discussion, independent practice activities, cooperative group learning). At the close of this

session, the instructors brainstormed ways in which they might incorporate the technology into their 1999 spring semester courses. Each instructor was asked to use GRT a minimum of two times with at least one of his or her undergraduate classes.

During the first few weeks of the 1999 spring semester, the graduate research assistant met individually with the instructors to assist them as they prepared to use GRT with their classes. These activities included practice in operating the system, preparing specific lessons or questions to be pre-programmed into the system for use during class, and basic trouble shooting of the system. Each instructor taught his/her class using GRT at least twice during the semester. Within two weeks of the second use of GRT, data were collected on instructor perceptions.

We gathered data on instructor perceptions using semi-structured interviews. The interviews were conducted by a graduate student (not associated with the group response technology), who used a 17-question protocol to elicit the instructors' reflections. The questions were designed to elicit information regarding instructional purposes, instructional planning and preparation for using GRT, difficulties related to GRT use, and other instructional issues. Sample questions used in the interviews included: What were your expectations for using GRT? What instructional issues did GRT cause you to address when planning your lesson?, and What effects did GRT have on the flow and focus of class discussions? Each interview was 40 to 60 minutes in duration. At the end of the semester, each of the interviews was transcribed.

The purpose of our inquiry was to describe how teacher education faculty used GRT in their courses and explore their reflections on the use of this technology as an instructional tool. More specifically, we wanted to explore their expectations for GRT use, comfort in using GRT, and evaluation of the GRT system. To accomplish this task, we carefully reviewed each instructor's interview, noting instances in which their comments related to the three topics of interest.

Findings

We began our analysis of the data by examining the frequency and manner in which the instructors chose to use GRT. Four instructors used the system two times during the semester; the fifth instructor used GRT three times. A review of interview transcripts indicated that the instructors used the system most often for whole group discussions (N = 4), followed by demonstrations of the system and multiple uses (N = 2 each). Multiple uses referred to class sessions during which the instructor used the system in more than one manner during a single session (e.g., whole group discussion and individual work). The instructors, who used the GRT system in multiple ways, each reported that they used GRT for small group activities and individual student work.

Most commonly, the instructors chose to use GRT to introduce new material. In two cases (Instructors B and C), this was new content related to the methods course; in two other cases (D and E), the "content" of the instructional session was the technology itself. Instructor A chose to use GRT to reinforce previously taught content in preparation for an exam.

Instructor	Course	Lesson Content/Structure by Use of GRT
A	Teaching Strategies (sophomore level)	1) Reinforce and review material for an exam; 2) Instructor provided brief review, asks question, students respond on GRT, answers displayed for all and

		discussed
B	Social Studies Methods (junior/senior level)	Three different lessons, each to introduce a new topic to the class. 1) Modeled a social studies lesson involving group discussion, students used GRT to respond to questions, view others' responses, and discuss responses; 2) Small group activity (one terminal per group): groups respond to questions, followed by public display and discussion of responses; 3) Group and individual responses to activities involving formal reasoning
C	Secondary Reading Methods (junior level)	1) Introduce a new topic (promoting discussion in the classroom); 2) Combination of instructor lecture and student responses to open-ended questions (responses displayed for the class and discussed).
D	Instructional Technology (junior level)	1) Demonstrate features of the system for students pursuing a minor in educational computing; 2) Demonstrate features of the system for students pursuing a minor in educational computing
E	Student Teaching Seminar (senior level)	1) Demonstrate features of the system for student teachers; 2) Provide student teachers an opportunity to experience GRT as students

Table 1: Instructors' courses and use of GRT

Expectations and Instructional Purposes:

Prior to their use of the system, the instructors possessed expectations for the GRT. That is, they expected the technology to contain certain features that would allow them to access and manipulate input gathered from students. Based, in part, on these expectations, the instructors had specific instructional purposes they wanted to achieve through the use of GRT.

Four of the instructors reported that they expected the GRT system to alter class discussions by allowing more students to participate. Instructor A noted, *"...I thought this might be a good way to better hear form those students in my classroom ... who don't speak up regularly in whole class discussions."* Instructor C concurred, *"...I thought the [conversational mode of Discourse] would really assist me in reach[ing] those silent students. Because they tend to be there in our courses."* Instructor E anticipated GRT might alter class discussions because students would read other students' responses as opposed to hearing them. She hypothesized that students might generate higher quality answers when responding in written form, and that this, in turn, would alter class discussions. *"What I was hoping would happen later is students' responses would be more thought out because there*

was that forced automatic wait time. ... so I was hoping it would slow some of those students down to really think of well thought out answers instead of quick answers" (Instructor E).

In addition to altering class discussions, several instructors reported that they wanted to demonstrate new technology to their students and model how the technology can be integrated into regular teaching and learning. As an example, Instructor C remarked, *"I want students to experience technology as a natural part of whatever we're studying."*

Comfort

Of particulate interest to us was the degree of comfort the instructors experienced in preparing for and using GRT for group instruction. For the most part, the instructors reported that they were comfortable using GRT with their students. The greatest source of discomfort stemmed from technical or structural issues with the system. Instructor C reported that her biggest challenge in using Discourse® was remembering specific system commands and to switch between various modes in the system.

Two instructors indicated that the physical structure of the classroom with the GRT system was somewhat awkward and required them to adjust their instructional style. Instructor A commented, *"I felt I had my back or side to the class too much. Because I'm looking at the screen... with more practice I think it would be seamless between me changing the question and talking to my class."* Similarly, Instructor B noted, *"I might be in the back of the room talking and I want to change what's on the screen, so I have to quick run back up to the front of the room.... That alters my style a bit."*

Two instructors indicated that using the GRT changed their planning or preparation for class. Instructor A noted, *"The active participation of students was something I was cognizant of as I was... thinking about how.... I should be using [the study coms] in a way that helps student learn the most they can."* Instructor B also experienced changes in her preparations: *"It impacted the way I presented directions and tasks and information."*

Three of the instructors indicated that use of the GRT in class did impact the pacing and focus in their classes. In the student teaching seminar course, Instructor E was surprised to find that using GRT caused students to focus more on the mechanics of their writing. *"When we have worked on these questions before it was a very intimate close conversation and a lot of positive reinforcement between students. ...the focus changed from being a very cooperative learning and sharing to one of individual thought. ...The students become much more focused on their writing than on each other."* Two instructors reported that the pacing in the course changed because of GRT use. Instructor C found the pace of her class slowed: *"The pacing ... was affected because my students weren't using Discourse on a regular basis. ...they're not all very fast keyboard users. They are really careful about how they say what they say... So they need more think time before I expect them to start typing."*

Evaluation

Consistent with every type of technology used in the classroom, each of the instructors stated that s/he experienced minor technical problems with the GRT system. The majority of the difficulties stemmed from a lack of familiarity with the system. Other limitations cited by the instructors included becoming proficient in teaching with GRT and

the physical layout of the classroom. Instructor A noted, *"It's hard to practice [teaching with GRT] without an audience unless I'm hitting a study com and also working at the* Instructor B found GRT required changes in her usual patterns of movement within the classroom: *"It's a little bit cumbersome to have to go over to the computer. ...it takes you away from wandering around the desks. ... [Discourse] pretty much glues you to the front of the room so you can manipulate the computer."* The difficulties with the physical layout of the room were also noted by Instructor A, who commented, *" I felt I had my back or side to the class too much."*

Other challenges identified by the instructors included a shift away from focus on content and limited flexibility. Two instructors reported that when using GRT the students began to focus on minor writing concerns and not major subject matter issues. Instructor E indicated that GRT changed class discussions and *"brought out a lot of students' insecurities [about] their writings."* Instructor A pointed out that the GRT system limits spontaneity in the classroom: *"If students come up with a divergent idea, ... [GRT] didn't let us explore an option that could have lead to more learning."*

The instructors cited several positive aspects of using GRT, including monitoring students' responses to instruction and engaging a larger number of students. Instructor A noted, *"It's just a real easy way to scan, see who answered and who was off track, and see who I might have to do so teaching with later."* Instructor B also found the monitoring features to be beneficial: *When I was able to put up samples of students' comments, ... it allowed me to focus on specific things that were said and build off of them and make connections and have the comments visually in front of the students... it provided an accurate representation of what the students said rather than me trying to rephrase it and may be putting my own twist on it unintentionally. I think it influenced [my ability to lead discussions] in a positive way."* In addition, Instructor B found the ability to include all students' responses to be significant: *"...Everyone got to have a say. Whether everybody's [comment] got up on the board or not, I got to see that everybody was things and what they were thinking."*

Conclusions

The purpose of this study was to describe how teacher educators used GRT with undergraduate students and their reflections on their use of the system. Consistent with their expectations, the instructors reported that the use of GRT effected class discussions by increasing the number of students actively involved in class. Two instructors stated that using GRT allowed them to hear from all students and monitor their thinking during class sessions. In addition, two instructors reported that their pacing was slowed due to GRT use.

The instructors stated that, for the most part, they were comfortable using GRT, although it did cause them to alter their instructional style slightly. In their evaluation of the system, the instructors cited several limitations of the GRT system that impacted their instruction. It should be noted that some of the technical limitations cited by the instructors were due to the instructors' lack of experience or fluency in using GRT. As the instructors become more experienced, their perceptions of system limitations may change.

It is clear from the data that the instructors were generally positive about the use of GRT. It is relevant to note, however, that the instructors who participated in this study were first-time users of GRT. Thus, the researchers are cautious regarding implications of the study. In this exploratory study, GRT appeared to meet the challenges of teacher education by providing a participatory learning environment where instructors can efficiently monitor student progress during instruction. To more fully understand the potential of GRT for group

instruction, faculty will need to become more familiar with GRT systems and make them a more natural part of the classroom structure.

References

Benjamin, L. T. (1991). Personalization and Active Learning in the Large Introductory Psychology Class. Teaching of Psychology 18(2), 68-74.

Foegen, A. & Hargrave, C. P. (1997). Discourse: Groupware for interactive classroom communication [Review of the computer groupware Discourse]. *Journal of Computing in Teacher Education*, 13(2), 30-32.

Foegen, A. & Hargrave, C. P. (1999). Group response technology in lecture-based instruction: Exploring student engagement and instructor perceptions. *Journal of Special Education Technology* 14 (1), 4-17.

Lortie, D. (1975). Schoolteacher. Chicago: University of Chicago Press.

Robinson, S. L. (1994). Classroom technology for the human touch: A mini case study using DISCOURSE. Curriculum/Technology Quarterly, 4(1), 1-4.

United States Department of Education (1999). Preparing Tomorrow's Teachers to Use Technology. Washington, D.C.

Understanding Graphics for Effective Communication

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Abstract: The use of graphics in screen design by students and teachers alike often fails to achieve real communication. Today's authoring tools allow designers to randomly select and place graphic imagery virtually anywhere in presentations, tutorials, etc. Some graphics are useful and important, others are basically neutral in their effect while others can detract or interfere with messages and ideas being presented. It is important to better understand graphics and how graphics affect screen design in order to improve communication. This paper reports recent research on teachers' use of graphics in HyperStudio screen displays. Graphic displays are analyzed and the use and application of graphic imagery is categorized into discrete levels based on their level of communication.

Introduction

Advancements in computer graphics technology, especially hypermedia, are changing the language of visual communication and defining multidimensional communication models that require new perspectives in information design (Search, 1993). Virtually any screen presentation is now considered passé poorly designed if lacking icons, graphics or other visual imagery. Icons can be used to represent information, concepts and ideas (Borg & Staufenbiel, 1992) and linkages (hotspots) to other information sites. Graphic symbols may only decorate screen displays yet can be used to convey or identify information, summaries or overviews, supplying instructions, and indicate position, size, representation, and more (Pettersson, 1993).

It has been said that a picture is worth a thousand words. In fact, graphics have been described as so information-rich that it is difficult to fully account for the content. Structured or systematic classifications of the communication, information or effectiveness of graphics is even more difficult. Tiemens (1993) provides seven categories to account for visual imagery: (a) duration, (b) transition, (c) framing, (d) view angle, (e) orientation, (f) motion, and (g) content. While this classification system might be useful, Tiemens calls for the need to organize or classify the use and application of graphics and visual imagery to better analyze their value. Communication value, the conveyance of ideas through visual representations, is difficult to analyze and catalog without rules and codes for the application of graphic imagery. Misanchuk and Schwier (1995) further attest to the problem of lacking protocols for guiding the design of graphics and screen imagery for instructional purposes.

Graphics are among numerous important components of screen displays (Schaefermeyer, 1990) from text style to scrolling effects and graphic line design (Aspillaga, 1992). Overall screen design and graphic appearance are also important variables in effective communication and user-interface for hypermedia of all types including web page design (Descy, 1995; Van Brakel, 1995). Research has shown that computer screen displays can affect learning (Costello, 1995; Hathaway, 1984) and retention (Aspillaga, 1991). Even the early years of computer technology in education called for software that would more fully utilize the visual versatility of the medium. Graphics and graphic imagery do affect the learner's understanding of material and provide additional meaning to text displays. But, the role that graphic symbols play in screen design of educational products should also account for the needs of specific audiences (Emery, 1993).

Graphic Appearance

Ready-to-use clip art is available in many software packages and respectable graphics are easily created with drawing tools available on virtually any machine. Yet, graphics can be poorly applied and reduced to achieving a mere decoration or, in worse cases, even distraction from the primary content. There is a need to

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actually think visually in spite of current limitations of the medium (Gibbs & Fewell, 1997). Graphics can be abstract lines and figures, or pictures, logos, etc. any of may be intended as realistic or merely representational (Eugenio, 1994).

Philleo (1993) looked at using graphics on buttons and hotspots in HyperCard with middle school kids. He looked at (a) graphic appearance, (b) user curiosity and attention to buttons with graphics, and (c) the relationship between graphic and content. However, the research yielded no significant conclusions other than the general usefulness of the hyper- medium. It left many questions yet to be explored.

Graphics can provide clues to trails and pathways through instructional hypermedia and help to structure the information presented. Graphics may be considered in terms of their design and appearance as well as how well they may be understood (Kearsley, 1988). The cognitive impact of icon design (Lee, 1996) addresses issues of color, size, placement and the inclusion of text in terms of how these elements actually affect understanding. The complete setting, including the background, can affect the recognizability or retrievability (meaningful understanding) of graphic imagery (McNair, 1996).

While graphics can be analyzed intrinsically, it is a common concern of computerized presentations that graphics be considered in terms of the human-computer interface. That is, looking at graphics beyond their mere physical characteristics and considering attention value versus learning and recall, the relationship between packaging and content, and therefore the overall effectiveness of communication (McFarland,1995). Knupfer (1997) examined the use of graphics and icons in web page design as tools for communication, including aesthetics and functionality. Educational and school web sites tended to use text rather than images to present information; sometimes overuse of backgrounds interfered with the overall message. Non-educational sites were similar except that professionally developed commercial sites contained a greater use of animations and more sophisticated graphics

A system for understanding graphics in terms of their communication value is needed. The study below outlines a structured approach in which graphic imagery is categorized into 6 levels of communication from meaningless abstractions to conveying conceptual relationships and compound notions.

The Study

The Course

In-service teachers (n=30) participated in a summer workshop on using HyperStudio. While approximately three-quarters were beginners in using computers, all were new to using HyperStudio and hypermedia in general. The teachers were to create three stacks (hypermedia presentations) during the 6 week course. They were (a) a linear presentation, (b) a virtual tour, and (c) an instructional stack. No specific topics were assigned and no specific parameters were assigned about the percentage of graphic imagery versus text in screen design. The communication value of graphics with examples across all levels described below was presented as well as other communicative aspects of overall screen design.

The linear presentation project called for students to design a relatively brief presentation of 5 to 7 cards (hypermedia screen views) arranged linearly with no hyper-jumps included. This "slide-show" concept was to be consistent with making a presentation to a passive audience in a lecture format. The sophistication of screen design was completely up to the ingenuity of the teachers. Other than small, one-card activities to review tool use and other functions, this was to be the first actual assignment to be completed early in the course.

The virtual tour project (second in the course) called for teachers to create a virtual world of some geographical spatial area that could be toured by the reader. The virtual world was to provide information and a realistic sense of being in that place in terms of geographic locations (forward, back, left, right, in, out, etc.). For example, one might enter the door of an art museum and walk through the rooms or halls to view the exhibits contained inside. This project did not call for an animation component for creating the actual sensation of movement. In other words, this was not to be a simulation of motion and travel. It was instead to be an exploration or expedition through both a topic and a geographical space in which that topic might normally be found. Another example, might be a walk along the boardwalk next to the beach. One might move forward or back, left or right to move from one shop or attraction to the next. Depending on the map or physical orientation involved, one might turn and see the beach as well. The goal of their project was to present information about the sites, attractions and points of interest in that virtual area. Whether that information was to be primarily graphic or textual was left to the teacher.

The instructional stack was intended as a self-guided tutorial or instructional presentation, but in any event, to serve in the process of teaching. Too, it was not to be merely linear as in the first assignment and would thus

need a multidirectional, hyper-linked layout. This assignment was to be more substantial overall, communicate more and better than the first because this was their final work in the course.

Exclusions and Limitations

Many issues are faced in the development of effective screen display: too much or too little, black and white or color, clip-art or hand-drawn, scanned or downloaded, and more. The term graphics is often used to refer to everything from buttons to full-motion video. For this report, the term graphics is meant to include geometric shapes, clip art, drawn or imported images, including black and white, color and even animated graphic images. Furthermore, the term "graphics" addresses generally discrete images as separate entities and thus ignores the potential of combining graphics into a composite or a choreographed symphony of interaction for a combination design or communication effect. Sound, while often an issue in screen design, was not considered except to the extent that a graphic symbol or image may be associated with that sound. Video per se is considered categorically separate from the graphics drawings, images, pictures and icons of this study.

Certainly there are different types of graphics. The distinctions between object-oriented, vector or bit-mapped graphics is irrelevant in this study and more appropriately relates to how such graphics are created than the role they play in screen appearance. Various methods of drawing and creating graphics have both merit and limitations depending on the application and one's personal skills. Sources of graphic imagery are basically irrelevant in this study as the focus is instead on its use and on-screen role and communication value. Distinctions between drawing original images versus using commercial clip-art or downloading imagery from the Internet also have no bearing on display uses and more appropriately relate to issues of availability, ease of acquisition and such.

This paper does not address the operational function of graphic images as programmed objects to perform tasks or as mapped hotspots to execute actions. It is the role of the graphic object and its application to the screen design and communication value that is of interest here. Certainly, programmed functionality can be applied, depending on the software used, to any graphic or portion of a graphic at virtually any level of screen application. For example, a simple 3x5 card frame or picture frame line or image that might be used to contain text or another graphic image, low in communication value, can itself be programmed as a hot-spot in HyperStudio, in HTML Web-page programming and other software packages. Also, an image of gears or pulleys for a display about industry (higher in communication value) might be programmed to execute specific actions, again depending on the software. Nevertheless, the functionality is irrelevant to the role of the graphic design and communication value. There are many important issues about programming functionality into hyper-media applications for graphics as well as text. These issues are better left to another discussion and have little or no real bearing on the levels of graphic use outlined in this paper.

Graphic Communication System

The system involves six levels of use or application of graphic imagery in screen design and communication. These levels represent a hierarchy of sophistication and complexity in the graphic's communication value in screen design. These levels do not rate the sophistication or complexity of the graphic images themselves. Graphics are identified and classified into one of the 6 levels with the notion that higher is better in terms of conveying and representing clear and useful ideas.

It may be that more complex graphic designs would serve better or might be more functional at any of the various levels to achieve the prescribed purpose while the role in communication remains the same. For example, a simple black box frame (level 1) might be sufficient to delimit text from the surrounding screen area. However, a box with gradient color and varied line thickness might somehow serve better in the aesthetics or general appeal of the screen appearance. Another example, a simple, two-dimensional triangular shape (level 5) might be sufficient and effective in instruction, where as, a three-dimensional triangular object with shadow effects might be preferred. In each case the use or application of the graphic object - the role the graphic image plays in the display - would be the same: level 1 versus level 5.

The six levels are detailed below and include a description of examples to assist in evaluating screen designs. Of course, different observers might interpret these descriptions differently.

Level - 1

Includes the most basic, abstract geometric shapes such as boxes, lines, circles, arrows, etc. These graphics are used primarily to establish abstract separations, to delimit screen areas, to create borders, separate text, provide some color, etc. These graphics have no particular appearance other than general geometric shapes and may often decorate screen appearance or focus attention on other screen components.

Level - 2

Includes shapes, clip art and images for purposes similar to level 1 above. These graphics would more likely be specifically designed for the role they play in the screen design. It may be that they're commercially designed (clip art) and thus, their quality may more clearly establish their role and purpose. For example, a picture of a notebook, window or stage, courtyard or patio, etc., which might be used to delimit screen areas, to create borders, provide some color or provide on-screen containers for text or other material.

Level - 3

Includes shapes, clip art and images, drawn or commercial, provided for purposes of decorating the screen. The decorative effect is likely limited to random, ambiguous or very general purposes. For example, the inclusion of a smiley face, stick figure, a star or the sun, etc., all of which serve no specific communication purpose.

Level - 4

Again, this level includes shapes, clip art and images, drawn or commercial. These graphics would be used to decorate a screen display consistent with or to establish a theme. The primary difference from level 3 above is that these graphics seem to focus attention on a particular or specific idea and thereby serve to further that notion. For example, an apple or school house on a screen for teachers, a car or stop light on screen for drivers, a compass or sextant on a screen about explorers, etc.

Level - 5

Again, this level includes Include shapes, clip art and images, drawn or commercial. But, more than merely establishing a theme, these graphics tend to convey ideas and are often objects used in instruction. That is, they may instruct or be referenced in instruction. The images themselves are not mere decoration and are intended as the focus of the display. For example, triangles referenced in instruction on geometry, a clock image for telling time, component parts for constructing machines, etc.

Level - 6

Again, this level includes Include shapes, clip art and images, drawn or commercial. This highest form of graphic imagery is used to communicate specific and more complex ideas and concepts important in the communication. The notion that a picture is worth a 1000 words. Such graphics might include conceptual relationships conveyed in the imagery itself but somewhat more sophisticated than level 5 above. For example, a turning earth used to illustrate planetary rotation, etc.

Results and Discussion

In general, most projects were under developed and involved fewer cards than expected. Hand-drawn graphics were poor in appearance as skills with tools and mouse control were weak. The virtual tour project was somewhat misunderstood and many of the instructional projects were little more than linear presentations and thus lacked sufficient multidirectional linkage. However, these findings were incidental to the graphical classification system being employed in this study.

Graphics were tallied and classified while observing presentations of their completed projects. Figure 1 illustrates that teachers make frequent use of simple shapes like lines and boxes in their screen displays an average of 4.31 times per student across their three projects. This is an interesting comparison with the significantly less average of 1.31 occurrences of level 2 graphics, which can achieve a more or less similar purpose but at a higher quality.

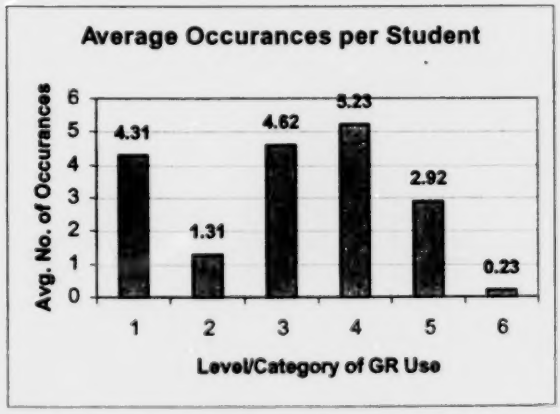

Figure 1: Average occurrences of graphic levels in student HyperStudio projects.

Levels 3 and 4 proved to be the highest occurrences of 4.62 and 5.23 respectively indicating that graphic imagery was typically used for purposes of decorating the screen. There seems to have been a balance between the general or random application of miscellaneous graphics and those used to emphasize or support a theme or topic.

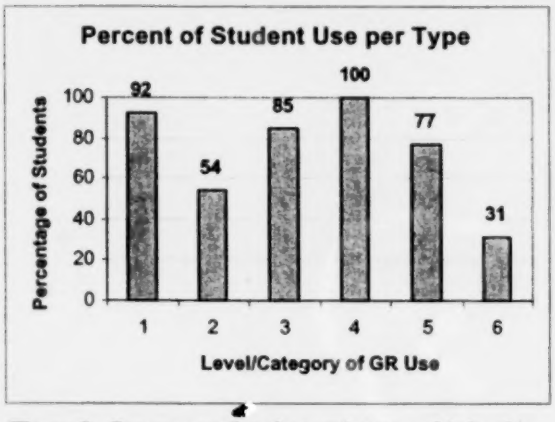

Figure 2: Percentage of students using a graphic level in HyperStudio projects.

Much more infrequent were level 5 graphics (2.92) that might have been referenced in instruction or been used to convey actual ideas. Of course, at 0.28 level 6 graphics were practically nonexistent and the least used out of all categories.

As shown in Figure 2, the quantity of teachers who designed and used graphics of the various types (at least one instance across the three projects) is quite similar across the categories to the averages per student. With 100 percent of the students using type 4 graphics they all thought in terms of using graphics to support a theme or topic. Of course, a low 31 percent of teachers used any graphics that conveyed actual concepts and notions intrinsic to the graphic itself. It is encouraging that 77 percent of teachers had at least one instance of level 5 graphics - imagery used to instruct or assist with instruction.

This study of course provides no standardization or inter-rater reliability and different observers might judge the same screen displays differently. The judgments made in this study, while consistently applied from a single observer, are nevertheless subjective and debatable. This largest form of graphic use from these teachers - levels 3 and 4, decorative graphics - is still considered weak in communication value. Graphic use generally failed to make the shift to becoming functional tools of communication.

The notion that graphics can intrinsically convey complex notions and ideas seems lost on most amateur designers. Teachers almost presume that the very purpose and intent of graphic imagery is merely to decorate in support of a general theme. It may be that these teachers tend to seek a comfortable balance, a kind of moderation, between text and graphics without much effort toward communicating with graphics. Text is readily available and easily applied to virtually any screen area and thus tends to become the preferred method of communicating ideas. As most of these teachers were beginners with computing and hypermedia, a simpler explanation might simply be that their history of communication was predominantly words.

There are of course many interesting questions that can be examined using this categorization method. For example, how do art teachers, who may be comfortable with and experienced in designing graphic and pictorial imagery, compare with language arts or literature teachers in designing hypermedia presentations? Of course, it would be important to examine how teachers can be directed or influenced to think in terms of graphic communication. Virtually any prompt or treatment can be examined with control groups using this system of classifying and understanding how graphics can be made to communicate ideas.

References

Aspillaga, M. (1991). Screen Design: Location of Information and Its Effects on Learning. *Journal of Computer-Based Instruction; 18* (3), 89-92.

Aspillaga, M. (1992). Implications of Screen Design upon Learning. *Journal of Educational Technology Systems, 20* (1) 53-58.

Borg, I.; & Staufenbiel, T. (1992). The performance of snow flakes, suns, and factorial suns in the graphic representation of multivariate data. *Multivariate Behavioral Research, 27* (1), 43-55.

Costello, J. (1995). Interactive Multimedia Design: A Visual Approach. *Journal of Interactive Instruction Development, 8* (2), 3-7.

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Descy, D. E. (1995). Adding Graphics to Your WWW Page. *TechTrends; 40* (6), 9-11.

Emery, D, (1993). Developing Effective Instructional Graphics. *Journal of Interactive Instruction Development, 6* (2), 20-24.

Eugenio, V. (1994). Deciding between realistic and representational visual images: Findings from the literature. *Journal of Instruction Delivery Systems, 8* (4), p23-27.

Gibbs, W. J.; & Fewell, P. J. (1997). Virtual courses and visual media. In: *VisionQuest: Journeys toward Visual Literacy.* From the Annual Conference of the International Visual Literacy Association (Cheyenne, Wyoming, October, 1996).

Hathaway, M. D. (1984). Variables of Computer Screen Display and How They Affect Learning. Educational Technology; 24 (1) 7-11. In *Proceedings of the 1997 National Convention of the Association for Educational Communications and Technology.* Albuquerque, NM, February 14-18, 1997 (see Eric Document I.D. #ED409846.)

Kearsley, Greg (1988). Authoring Considerations for Hypertext. *Educational Technology, 28* (11), 1-24.

Knupfer, N. N. (1997). Visual aesthetics and functionality of web pages: Where is the design? In: *Proceedings of the 1997 National Convention of the Association for Educational Communications and Technology*, Albuquerque, NM, February 14-18, 1997. (see Eric Document I.D. # ED409846.)

Lee, S. C. (1996). Perceptual considerations in icon design for instructional communication. *Educational Technology, 36* (2) p58-60.

McFarland, R. D. (1995). Ten design points for the human interface to instructional multimedia. *T.H.E. Journal, 22* (7), p67-69.

McNair, J. R. (1996). Computer icons and the art of memory. *Technical Communication Quarterly, 5* (1), p77-86.

McNair, J. R. (1996). Computer icons and the art of memory. *Technical Communication Quarterly, 5* (1), p77-86.

Misanchuk, E. R.; & Schwier, R. A. (1995). The mythology of colour in multimedia screen design: Art, science, and connoisseurship. *Canadian Journal of Educational Communication, 24* (1), p3-26.

Pettersson, R. (1993). Using digital image elements to produce schematic pictures. In: *Visual Literacy in the Digital Age.* From the Annual Conference of the International Visual Literacy Association (Rochester, New York, October 13-17, 1993).

Philleo, T. (1993). Icon images in HyperCard: An exploration of visual concepts with middle school students. In: *Art, Science & Visual Literacy.* From the Annual Conference of the International Visual Literacy Association (Pittsburgh, PA, September 30-October 4, 1992).

Schaefermeyer, S. (1990). Standards for Instructional Computing Software Design and Development. *Educational Technology, 30* (6), 9-15.

Search, P. (1993). Computer graphics: Changing the language of visual communication. *Journal of the Society for Technical Communication, 40* (4), p629-37.

Tiemens, R. K. (1993). Analyzing the content of visual messages: Methodological considerations. In: *Verbo-Visual Literacy: Understanding and Applying New Educational Communication Media Technologies.* From the Symposium of the International Visual Literacy Association (Delphi, Greece, June 25-29, 1993).

Van Brakel, Pieter A.; And Others, (1995). Some guidelines for creating World Wide Web home page files. *Electronic Library, 13* (4), 383-388.

A Study of Two Online Learning Innovations: Implications for Teacher Education and Professional Development

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Abstract: This paper reports on a study of the implementation of two telelearning projects based on different pedagogical models and using different delivery systems. One of these projects was perceived to be more successfully implemented than the other. By means of a comparative analysis of teachers' reported experiences with the two programs, we illustrate what factors beyond training and support contributed to their relative success and failure, and to describe how these factors interacted with the traditional elements of implementation. A theoretical model of telelearning implementation is then articulated and related to traditional views of program implementation. The paper concludes by considering the implications of the analysis for effective teacher training and professional development in the use of online learning environments in schools.

Introduction

When planning the implementation of technologically innovative classroom projects in schools, administrators and project leaders tend to believe that a project will be successful if teachers are provided with enough training and support for the innovation. Yet, the process of implementing such projects is often not as straightforward as proponents of the technology thought it would be. As Kerr (1996) notes:

> [C]ontrary to the expectations of some pro-technology advocates, the process of adopting new devices and the approaches they make possible is neither rapid nor easy, nor does it automatically lead to the sort of revolutionary restructuring of teaching that proponents have predicted (pp.115-116).

While studies do indicate that traditional support for teachers in the form of training and *in situ* coaching are crucial to a project's success, another consideration has been found to be equally important—the educational practices and contexts within which the use of the technology is embedded.

According to Thérèse Laferrière and her colleagues at Canada's SchoolNet: "effective use of the technology is embedded within practices and activities that realize its functionality for specific purposes and situations...[T]he potential of new technologies is immense, but many conditions are required for this potential to become a reality in classrooms and schools" Bracewell, and Laferrière, 1996).

Similarly, Plomp, Brummelhuis and Pelgrum (1997) claim, "...the integration of technology in education depends upon not one factor, but on interconnected elements that will vary according to the level of implementation of technology" (p. 468).

Without consideration of the many interrelated factors associated with the implementation of a new technology, there can be no significant impact on students' learning. As The U.S. Office of Technology Assessment states, "it is becoming increasingly clear that technology in and of itself, does not directly change teaching or learning. Rather, the critical element is how technology is incorporated into instruction" (U.S. Congress Office of Technology Assessment, 1995, p. 57).

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The Study

We investigated teachers' perspectives on the implementation of two telelearning projects based on different pedagogical models and using different delivery systems. One of these projects was perceived to be more successfully implemented than the other. By means of a comparative analysis of the two programs, we illustrate what factors beyond training and support contributed to their relative success and failure, and describe how these factors interacted with these two traditional elements of implementation. A theoretical model of telelearning implementation is then articulated and related to traditional views of program implementation. Finally, the implications of this analysis for effective teacher training and professional development in the use of online learning environments in schools are discussed.

The two telelearning programs studied were the Satellite Network Schools (SNS) and Writers in Electronic Residence (WIER). The SNS company links schools via digital satellite to a commercial curriculum content provider headquartered in the United States and offers a collection of over 12,000 videos indexed to the K-12 curriculum. The service included a two-way interactive television channel, development of "custom curriculum", printed curriculum resources, and a selection of interactive software.

Only three Canadian schools were connected to SNS and all were studied during their first and second year of program implementation. A company consultant trained teachers on-site via one and two day workshops on the technical, operational, and (to some extent) pedagogical aspects of the system, and several options were made available for resolving technical problems and providing curriculum selection and development assistance.

WIER, a university-based telelearning project at a mature stage of development (it has been in operation for about ten years), involves up to 120 classes from all across Canada ranging in level from junior elementary to senior high. It uses a network conferencing system to link writing and language arts students to Canadian authors, teachers, and each other for the exchange and discussion of original work. Students "post" drafts, an assigned author reads and responds with comments and revision suggestions, and students also read and respond to work posted by other schools. Teachers are encouraged to do the same.

Training for WIER use consists of an initial two-week online orientation for teachers. Only online and written materials are made available—no in-person training or support is provided. Experienced teachers act as teacher-moderators through an online forum WIER provides for trouble-shooting on technical and program issues.

Method

Semi-structured interviews with school staff were conducted to glean information on the process of program implementation, and its effects, from the teachers' perspectives. For SNS, interviews were held at the beginning of the project and followed up one year later (n=38). For WIER, teachers using the program from eleven participating schools were interviewed. All interviews were audio taped, transcribed, qualitatively coded and analyzed. The focus of analysis for this study was on the teacher-related dimensions of attitude and behavior that contributed to the success or failure of the online program.

Findings

SNS was perceived by most of the interviewees to have had very limited success. In sharp contrast, WIER was praised as having been a very effective online learning experience. Two key factors beyond training and support emerged from our analysis as central in determining a project's perceived outcome: (1) the teachers' perceptions of the value of the program, and (2) the congruence between the pedagogy implicit in the program's design and operation and the teacher's own practices. Our contention is that these two dimensions, together with training and support, played the major role in determining the ultimate success and sustainability of the program.

Initially, SNS appeared highly attractive to most teachers. In practice, the system was complicated to learn, technologically overwhelming, appeared to make too many time demands on teachers relative to the results obtained, and was lacking in quality. The content was often irrelevant, too diluted for the level requested, and often contained errors. The service support staff, although described as friendly and helpful, did not always call back or answer the phone, did not acknowledge or correct errors, had difficulty fulfilling

custom video requests, and were found wanting in subject area expertise. All in all, SNS seemed burdensome to incorporate into the curriculum and practice.

As for WIER, teachers found that the training material and two-week orientation proved sufficient to access and use the conferencing system. Technical support provided by computer teachers or technicians and WIER's forum for questions and issues filled in gaps experienced by teachers. Uploading and downloading material was time intensive; teachers preferred to undertake or closely supervise this task to ensure the appropriateness of all material being posted to conferences. The fit of the WIER timetable to school schedules sometimes made posting difficult and limited extended dialogue between authors and students over several revisions. Also, these posting deadlines or class priorities set by teachers limited time available for reading other students' posted stories.

The perceived value of SNS and WIER also differed. Regarding SNS, teachers felt that the investment of time and effort made to use its resources was generally not worthwhile. Occasionally, the system was useful for the teaching of typically difficult or boring topics but it was mainly employed for learning reinforcement purposes. Lack of Canadian content (accents, metric, word spellings, terms and definitions, law and history, and authors) and grade appropriate material proved significant concerns. The perceived educational value of WIER, however, outweighed the difficulties and limitations it presented. According to the teachers, students of all levels demonstrated an increased motivation to write. The WIER program was seen as offering students a broader and more meaningful audience for their work, heightening the authenticity of the writing process. It was also perceived as allowing students to learn the value of giving and receiving constructive criticism and to absorb new approaches to considering their work on the basis of the comments made by professional authors.

The degree of congruence in pedagogical approach between the teachers' own teaching style and that of the programs also played an instrumental role in the teachers' willingness to incorporate SNS and WIER into their classroom activities. In the case of SNS, senior school board personnel made the decision to adopt the program, and teachers, particularly those teaching mathematics and science, were expected to make use of the service. This pressure coupled with the problems encountered that were discussed earlier, produced frustration— especially since teachers simply were not happy with the fit of the materials to their curriculum and teaching styles. SNS did allow for varied learning opportunities, concept repetition, and support and practice in learning concepts taught by the teacher, but the resources was consistently noted as being pedagogically and curricularly weak. Conversely, the perceived program worth of WIER outweighed the burden it imposed by its rigid scheduling and time demands. The process-writing orientation and professional development it offered was in harmony with ongoing teacher practice— teachers saw that it supported, augmented and increased the efficacy of their pedagogy. Comments by the professional authors validated the teachers' own responses to student work, and teachers appreciated the greater opportunity WIER afforded them to assume more frequently the role of writing facilitator (as opposed to writing grader).

Discussion

Implementation success—or the lack of it—could be attributed to the dialectic relationship amongst the following teacher factors: (1) training and support, (2) the perceived value of the telelearning network in promoting desired educational outcomes, and (3) the congruence of the network with teachers' pedagogical practices. WIER offered educational depth and meaning to both teachers and students. SNS offered some student motivational value but its educational merit was perceived to be lacking and its pedagogical approach was seen as divergent from those practices considered desirable by teachers..

A sequence of events appeared to influence the success of implementation: at first, teachers' initial perceptions of the program determined the amount of time and effort initially devoted to its use. Following the initial experiences with the program in the classroom, continuing use was dependent upon (1) whether the program did or did not match what were considered desirable teaching practices and (2) whether the perceived program value was high or low. The pivotal issue surrounding the extent to which teachers were willing to put the time and effort into developing a mastery of the technology appeared to be the opportunities the program offered for new possibilities for learning and teaching in a manner that the teacher found pedagogically acceptable and practicable.

Our analysis suggests several implications for teacher education and ongoing professional development. First, teachers must be active participants in any decision to participate in online learning initiatives.

Without their active and willing support, implementation is bound to fail, regardless of what support structures and processes are in place. But teachers cannot be expected to make considered decisions without being given the opportunity to develop a thorough understanding of the basic principles, potentials, and limitations that these new learning media present. Both pre-service and in-service teacher education programs need to provide teachers with opportunities to study about and learn with these technologies. Prior acquisition of operational competency can significantly reduce the learning curve for teaching staff when such new learning resources are introduced, decreasing their resistance to innovation. And successful experiences with online learning in conjunction with exposure to a range of potential in-class applications during pre- or in-service education will allow teachers to make more informed decisions about online learning implementation.. Teachers will be better prepared to both contribute to the deliberations when a district or school considers acquiring a new online technology and to make effective use of these new resources. Recent research reviews make it clear out that teachers must have a significant level of knowledge and skill to effectively use online learning environments (Grégoire et al., 1996; Bracewell et al., 1998).

Another implication of this study is that the pedagogy associated with a telelearning network should be largely congruent with that of the vast majority of teachers who will use it, since the degree of congruence appears to be related to implementation success. Significant divergence in pedagogical perspectives can seriously impede implementation. As the Schoolnet review points out, technology infusion "does not diminish the controversies and conflicts that pertain to school improvement efforts. On the contrary, it illuminates existing debates from new positions. It acts as a debate catalyst, as individuals bring to the debate their own perceptions of what technology can do or not, and of what school is about" (Bracewell et al., 1998, p. 22). If (as is often the case) the implementation of online learning is being used as a "Trojan horse" to foster the adoption of a more constructivist or knowledge-building pedagogy, our results indicate that even a well-supported program is unlikely to succeed unless the culture of teaching and learning in the institution is first addressed. Formal and informal teacher education can play a major role in helping teachers become aware of the value of these new perspectives on practice prior to the introduction of new technologies and programs, fostering their willingness to try new approaches and providing them with the more general pedagogical skills that are the necessary foundation for online program success.

A final, related implication is that providing teacher support and assistance is a necessary but not a sufficient condition for implementation success. The necessity of such support is not in question; it has been found in numerous studies to be critical in fostering innovation (Maddin, 1997; Benton Foundation, 1997). But regardless of the amount of support available to teachers, they need to see that a distinct advantage for their students will accrue for the implementation to proceed smoothly. In the present study, we saw that SNS teachers had an abundance of support, yet they were loath to take advantage of it because they did not see sufficient benefit in network use for their students. On the other hand, WIER teachers had a modest level of support, however they took it upon themselves to learn the system because they felt that their students would profit. Therefore, when a telelearning network is implemented, a wise strategy would be to structure network activities so that teachers obtain perceived educational successes with their students early on during the implementation process. This approach would encourage teachers to learn more about the network, either from taking advantage of formal support services or from collegial discussion and sharing. And it would provide a window of opportunity for professional development, by providing staff with the knowledge, experience, and motivation to gradually begin experimenting with variations in their traditional practices and roles.

References

Benton Foundation. (1997). *The learning connection: Schools in the information age* [On-line]. Available: http://www.benton.org/Library/Schools/

Bracewell, R., Breuleux, A., Laferriére, T., Benoit, J., & Abdous, M. (1998). *The emerging contribution of online resources and tools to classroom learning.* Ottawa, Canada: Schoolnet.

Graves, D. H. (1983). *Writing: Teachers and children at work.* Portsmouth, NH: Heinemann.

Grégoire, R., Bracewell, R., & Laferrière, T. (1996). *The contribution of new technologies to learning and teaching in elementary and secondary schools: Documentary review*. Ottawa, Canada: SchoolNet. Available: http://www.fse.ulaval.ca/fac/tact/fr/html/apport/impact96.html

Ham, V. (1997). Teachers speak up about managing technology. *Educational Leadership, 55(3),* 67-68.

Haymore-Sandholtz, J., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student-centered classrooms*. New York: Teachers College Press.

Kerr, S. T. (1996). Lever and fulcrum: Educational technology in teachers, thought and practice. In S. T. Kerr (Ed.), *Technology and the future of schooling, Ninety-fifth yearbook of the National Society for the Study of Education* (pp. 115-136).

Laferrière, T. (1997). A six-phase tentative general model of professional development. In Proceedings of The 14th International Conference on Information and Communication Technology in Education, Changing Practices and Technologies: Decisions now for the future (pp. 556-558). Arlington, TX: The International Conference on Technology and Education.

Maddin, E. A. (1997). The real job begins back in the classroom: On-the-job training and support for teachers using technology. *Educational Technology*, 37 (5), 56-59.

Plomp, T., Brummelhuis, A. C. A. ten, & Pelgrum, W. J. (1997). Nouvelles approches de l'enseignement, de l'apprentissage et de l'utilisation des technologies de l'information et de la communication dans l'éducation. *Perspectives, 27* (3), 457-475.

Soloway, E. (1996). Teachers are the key. *Communications of the ACM, 39 (6)*, 11-14.

U.S. Congress, Office of Technology Assessment. (1995). *Teachers and technology: Making the connection.* Washington, DC: Government Printing Office.

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Teaching Old Dogs New Tricks

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Abstract: Previous research into classroom life exposes the difficulty of integrating new technologies into teaching. Professors of teacher education courses should prepare students for technologically advanced classroom expectations, but to often these professors do not model the requisite new behaviors. By exploring the relationship between teacher beliefs and teacher resistence to change, a teacher education professor examines her own practice. An action research methodology provides a self case study of a teacher education professor who investigates how to reconcile beliefs about classroom life with the implementation of technology. Teacher beliefs about the nature of the student-teacher relationship, the importance of particular learning experiences, and the context of the classroom impact technology implementation. In the final analysis, the professor-researcher models to students her beliefs, hoping to shape the students' beliefs as future teachers confronted by innovative practice.

Introduction to the Question

Research into life in the classroom exposes deeply traditional dynamics (Lortie, 1975; Lieberman & Miller, 1984; Rosenholtz, 1989). The university classroom is seldom an exception (Schuttloffel, 1998b). Occasionally undergraduate teacher education students who arrive steeped in traditional classroom culture may resist or feel threatened by technology, but more often technological resistance comes from the professor (Cummings, 1995; Schuttloffel, 1998a, 1998b). Professors who have little teaching experience with newer technologies, or have not attempted to explore their usage in their courses, personify this reluctance. This paper presents my latest investigation into how to reconcile teacher beliefs about life in the classroom with the implementation of technology (Robinson, 1995; Schuttloffel, 1994,1998a, 1998b; Zachariades & Killingsworth, 1995). And, in the final analysis, this teacher education professor recognizes a need to model to students transformed practice, thus shaping the student's beliefs as future teachers working in an era of innovation (Smith *et al* 1986; 1987; 1988).

Over the last ten years my investigations into the contributing factors of successful school reform, the acceptance of innovative practice, and change in classroom practice consistently reverts to the beliefs teachers and school leaders treasure as integral to their practice and their being. Beliefs are those undergirding values and philosophical dispositions that provide the basis for decision making about practice (Sergiovanni, 1992). The beliefs of teachers and school leaders either facilitate changes in practice, or by comparison, those beliefs may impede innovation. Mindful decision making is what teachers and school leaders do (Zumwalt, 1989; Schuttloffel, 1999). During the decision-making process, teachers and school leaders who choose to incorporate an innovation into their practice connect the innovation to their belief system. Also, teachers and school leaders may choose to reject an innovation if a change in practice contradicts their fundamental beliefs.

The proposed purpose for technology implementation takes several forms. First, technology provides educators another tool to reach students and serve their needs. Or the integration of technology proposes to expand educational possibilities by transforming learning from the teacher-dominated classroom to a more student-centered environment (Dwyer,1991; Nickerson, 1988; Perelman, 1988). Next, reminiscent of the earlier futurist promises (Papert, 1980), technology serves as a vehicle for the visionary reform of educational institutions at all levels. Lastly, business leaders suggest that by increasing technical knowledge schools graduate a more productive worker for the marketplace. If today's technology promise centers around utilitarian motives, without ever questioning how technology confronts substantive teacher beliefs, how will its successful implementation be determined? The university classroom is an example of this struggle with the purpose for technology implementation.

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Pressure for increased integration of technology is an example of an innovation pushing for change in university classroom practice. Sophisticated web technologies challenge the core of traditional teaching practice, including the very concept of a classroom. Uncovering those teacher beliefs that support, or impede, the integration of technology are key to successful change in practice. Numerous studies of innovative practice focus on the technical elements of implementing new methodological approaches evidencing new classroom practice. Often overlooked are the more subtle reasons for the failure of reform efforts, such as teacher beliefs. Could beliefs about the role of teacher and learner, the worthiness of content knowledge, and the ideal of the student product impact a teacher's willingness to undergo the inconveniences demanded by changing their teaching practice? Seeking an answer to this question led me to scrutinize my own beliefs and practice. I recognized that I was doing little to model a change in practice for my teacher-education students. My case study documents my adventure with an innovative technology as an example of connecting my teacher beliefs with my teaching practice.

Methodology: Action Research and a Case Study

Action research bases its methodology on the premise that teachers investigate problems that arise from their classroom practice (Kemmis, & McTaggart, 1982). The question of changing my teaching practice due to new available technology emerged from my own university classroom. Since the education department's teacher-preparation program incorporates numerous action research strategies, this methodology seemed a logical choice. It also facilitated discussion with students and other faculty about what I was attempting to accomplish in my class.

Standard qualitative data collection methods (Wolcott, 1995; Eisner, 1985) were used in the study. For nearly one year I kept a journal account of my experiences including: the development of the course, the problems encountered, solutions or potential solutions, and interactions with assisting individuals. This article shares my self- case study as a teacher education professor with no prior experience with web-based instruction, who seeks to implement a new technology into an undergraduate course.

The Case of Dr. Mimi

The Catholic University of America is a medium size university set in northeast Washington, D.C. The most notable historical fact about the university is that it was created by the United States Catholic Bishops as a research university to provide scholarship for the Church and the nation. Although there exists today a thriving undergraduate college, research is the dominant identity of the institution. Recently there is clear direction from within and without the university to integrate technology into courses and to expand various courses into a web-based medium. Within this environment remarkably little has actually been done within most departments. My suspicion is that while some professors feel inadequate in using more complex technology, others experience an inherent conflict. These professors perceive that technology interferes with their deeply held beliefs about the role of teacher, the teaching-learning dynamic, and the meaning of attending a university.

An apparent dilemma for teacher education professors is the positive endorsement of new technologies for teacher education students while maintaining fairly traditional practice within the teacher-education program. The importance of preparing beginning teachers with a belief system that incorporates a critique of the available technologies seems obvious. This approach is consistent with a reflective framework which underpins the department's teacher-education program (Van Manen, 1977). Providing students model experiences in how one confronts these technologies within their teaching practice has been less readily achieved.

Beliefs. Providing the framework for my case study analysis are five core beliefs about teaching and learning. This list is not exhaustive, but its broad shape comes from my experiences as a student, those of my children, and my diversified teaching career. My twenty-five years in education cross the continuum from preschool to graduate doctoral students, public and parochial schools, as a teacher, school counselor, principal, and professor.

First, I believe students need teachers. Teachers bring knowledge to the context of learning both from their life experience and from advanced study. This rule generally applies to all levels of schooling and in all content areas. In other words, teachers are necessary to help students learn what, when, and how to learn.

My second belief is that students and teachers need to interact with each other. My own teacher training took place during a surge in student-centered classroom practice. Long before constructionism was identified, I learned its substance. For me then, teaching is not just relating information, but creating a learning environment that develops the whole person. Teachers guide students in their search for knowledge by providing maps, directions, and markers. It is fair to say that required undergraduate survey courses are not typically a hot-bed of student-centered learning. Often these classes are too large and impersonal for holistic student growth.

Thirdly, I believe knowledge is both eternal and changing. I accept that there are classics in literature, art, and music that are timeless in their ability to portray the human condition. I also recognize the growing body of biological, geophysical, and psychological knowledge available for exploration today. Even the topics of history and political theory, which might appear as constant, challenges a discussion to questions previously thought to be settled. Consider only the effect of the concept of human rights and how it has evolved and impacted the world in the twentieth century.

Fourth, I believe that students learn from each other. Students often have the ability to clarify concepts so that classmates comprehend. Students working together learn to compliment each other and learn to respect what each person contributes to the learning endeavor. Collaboration is key to problem solving in most settings.

Finally, I believe teaching and learning may take place in a variety of contexts. K-12 teachers readily admit the importance of explorations that take students outside the classroom. Curricular goals are often met in parks, museums, and historical sites. Practicum and student teaching experiences in teacher education programs are typically where students begin to connect theory to practice.

Events. My case study began with my introduction to the potential of web-based technology through a faculty orientation session. I was intrigued with the possibility of making my undergraduate course more user-friendly and supportive of student learning. From my experiences with the nature of sophomore behavior, outside classroom supports seemed like a practical way to meet their many needs. A web-based system of teaching was offered as a tool to meet my needs.

My experiences with learning the web-based technology had five phases: 1) great enthusiasm for what I potentially could accomplish with the web-course, 2) the belief that if I had enough information I could accomplish the task,
3) the bitter realization that even with assistance the task would be time consuming, 4) qualified hope that more time and assistance would allow me to take on a realistic form of the task, and 5) a sense of satisfaction that something had been accomplished and learned

Great Enthusiasm. I first contacted the Center for Planning and Information Technology in February of 1999. Those professionals are in charge of moving campus personnel toward total technological literacy. The director was enthusiastic to assist me in whatever way possible. He assured me that the process was very simple and that after an introductory lesson to the template program, I would be ready to go. I was given a password and my new course was entered into the system. After my discussion with the technology center I was extremely confident. I decided to jump right in and begin putting together my course.

Information is the Key. After I spent an afternoon trying to figure out the directions for beginning the web course I was both annoyed and humiliated. I decided that I needed some tutoring on the process. George was assigned to me. He is a veteran of the university and an experienced technology expert with numerous areas of expertise that more than qualified him for the task of helping me.

Our first session began with my explanation of the unproductive "loop" that I had been caught in while trying to begin the first task in the program. Two and one half hours later George resigned himself to our failure. He admitted that the program was new to him and he thought it would be easier. He apologized profusely about the difficulty of the task and assured me that he would help me get this course up and running by fall.

In April George focused on helping me set up my "welcome page" for the course. More work on the course made it increasingly clear that this was not going to be an easy task, even with George's help. My biggest set-back was realizing that I could not simply enter information into the web-course, each file had to be translated

into a programming language. Then once they were uploaded, these files were not easily changed. To prepare for this process, I returned to my office with a more new information about the program and a 500 page manual.

No Easy Solutions. May arrived and I went to see George in a computer lab where he had an office. I had brought one copy of my syllabus that I had saved in HTML When I opened the file, there were numerous formatting errors. George also pointed out that I should adjust all the material exactly how I wanted it to appear, (scheduling changes, assignments)as changes were difficult after the information files are on the web site. George also told me that he was pretty sure that I could not use my test bank without a means to translate it to HTML

I met with George in early June with all my files sorted and changed to HTML. I believed that it would be a simple process from then on and I would finally see some results from all the work. George was showing me how to upload the files when we came to a roadblock. He worked on it for a long time and then in frustration sent me home. He informed me that he would find out the answer and upload the files. The next time I heard from George, he was very pleased to tell me to look at my web course. He had loaded all my files. The site looked rather impressive to a novice. George assured me that he would be able to teach me how to upload files for myself.

At our next session in late July I brought the rest of the files to complete my course. George admitted that it would be harder than anticipated to upload the files. But, in spite of the loss of three key people, he would be available to do so. He also informed me that it would be helpful to continue to learn more about HTML to assist myself in this project. I then asked George about my other looming concern, the test bank. He informed me that there would be no way to upload the test bank into the template system. Questions would have to be individually entered. George suggested that I convert the files to HTML and circumvent the program's testing module. The new link would not be as efficient ,nor have all the features, but it would be simpler at this stage of the project. I had to take George's advice.

Qualified Hope. When I went to see George in August, I had good news. My old test bank files would not convert, but I had received from my textbook publisher a new test bank that could be converted to RFT and then to HTML I was very excited. George was now convinced that I would be better off to construct the quiz with this system and by-pass the template program's own testing process.

My Foundations of Education class met in late August in a "smart" classroom. I went through the usual introductions, but I added that I was trying to learn more about web-based technology. I pointed out that I would be experimenting with various elements of the process during their course. I wanted them to be aware that this was a learning process for me. They were intrigued by the idea of a web-site with support for the course.

In early September I forwarded my first quiz for George to post on the web-site. I told my class that we would not assemble in the classroom for the quiz. They would take the quiz off the web-site within a set period of time. Students seemed enthusiastic about the freedom. I urged them to use their textbook and notes to thoroughly complete the quiz. George posted the quiz on a Thursday morning.

On Thursday afternoon I received an email from a distraught student. He was concerned because I had posted the answers to the quiz as well as the questions. I contacted George that I needed to make a correction on the quiz upload. Fortunately, he was available to make the correction very quickly.

Learning and Satisfaction Shared. The next time my class met I informed them that the first quiz had answers posted for the first day. I also chided them for procrastinating and missing this golden opportunity! Then I shifted my discussion to my own difficulties with trying out new technology that I was not completely familiar with. My intention was to raise in students' consciousness the belief that teachers continue to learn by investigating new knowledge throughout their careers.

Throughout the remainder of the semester there were no more startling events with the quizzes. Students learn to use the information I provided, but more importantly I learned how to communicate any difficulties I was having with the web-course or the other available technical equipment.

Reflections on the Case Study

Reflection is a key element in action research (Ross, Bondy, & Kyle, 1993). Building upon Van Manen's three levels of reflection (1977) as a framework, I encourage my teacher education students to investigate inherent dilemmas in teaching practice. In the same manner, by reflecting critically on my teaching beliefs, the influence of values and educational philosophy reveals its impact on decision making that affect my teaching practice. The connection between beliefs as isolated theory or ideals and daily practice takes place at the interpretive level of reflection. My case study experiences exhibit my desire to communicate a clear message to students about the role of teacher and the teaching profession. I wanted my students to see teachers as persons who grow throughout their careers by exploring new knowledge and practice. At a technical level of reflection, I wanted my students to see teaching as a profession that requires continual updating and renewal in order to give students the benefits of current research and technological advancements, for example, my learning how to use web-based technology. My actions characterized my beliefs, sent messages, and attempted to create a particular meaning for teaching. My beliefs also required me to do something that was new, difficult, and ultimately changed my teaching practice.

An analysis of my introductory experiences with web-based technology provides some insights into how the web-based technology interfaced with my five beliefs about teaching and learning. First, I believe that teachers are necessary. This belief was exemplified in two ways during the case experiences. I desperately needed George as my teacher. He made it possible for me to leave the safe haven of my known terrain in teaching and move into a less familiar landscape which required new information. I also believed that my students needed me to teach them about life long learning as a role model learning a new methodology. I wanted the students to be aware of my experiences as a vehicle of my beliefs. I hoped that my actions would assist my students in identifying with me as a learner.

My second belief, that of the importance of teacher-student interactions, was given a boost by my emphasis in the usage of the course bulletin board and my own email address. I encouraged and received numerous communications from students. I was forced to consider the possibility that some students preferred the anonymity of email to visiting with me face to face. Interactions were supported through this experience and I was comforted.

My belief in the nature of knowledge as both eternal and changing, was less challenged by this experience than the methodological choices that determine how that knowledge is taught. The content of the course remained substantially the same, but the focus of attention shifted more accurately to reflect my curricular priorities. I believe further refinement of the web-based course will reinforce my efforts to arrive at the core material for this course.

I do not believe that I fully explored how to better create an environment within the classroom or within the web to facilitate peer learning. I think there are many possibilities and students are eager to consider them.

By allowing the students to take their quizzes out of the classroom I hoped to communicate my belief that learning takes place in many settings. The school site visits supported this belief. Again I think there is much room for growth in this area and it requires some imagination on my part to expand the classroom even further.

This case study points to the importance of continuing research on teaching and learning in technology-rich environments, the implications of transforming the traditional university, and the impact of professorial beliefs on such a transformation. A more thorough reflection on these complex issues is required before making university-wide decisions about technology implementation.

It is possible to teach an old dog new tricks, with care and treats.

References

Cummings, L. E. (1995). Educational Technology--A Faculty Resistance View. *Educational Technology Review*, (4),13-18.

Dwyer, D. C., Ringstaff, C., & Sandholtz, J. H. (May, 1991). Changes in teachers' beliefs and practices in technology-rich classrooms. *Educational Leadership*, pp. 45-52.
Eisner, E. (1985). *The educational imagination.* New York: Macmillan Publishing Co.

Kemmis, S., & McTaggart, R. (1982). *The action research planner.* Victoria, Australia: Deacon University Press

Lortie, D. C. (1975). *Schoolteacher: A sociological study.* Chicago: University of Chicago Press.

Lieberman, A., & Miller, L. (1984). *Teachers, their world, and their work: Implications for school improvement,* Alexandria, VA: ASCD.

Nickerson, R. S. (1988). Technology in Education in 2020: Thinking About the Not-Distant Future. In R. S. Nickerson & P. P. Zodhiates (Eds.), *Technology in Education: Looking Toward 2020* (p. 1-10). Hillsdale, NJ: Lawrence Erlbaum Associates.

Pappert, S. (1980). *Mindstorms.* New York: Basic Books.

Perelman, L. J. (September, 1988). Re..ructuring the system is the solution. *Phi Delta Kappan.*

Robinson, B. (1995). Teaching Teachers to Change: The Place of Change Theory in the Technology Education of Teachers. *Journal of Technology and Teacher Education,* 3(2/3), 107-117.

Rosenholtz, S. J. (1989). *Teachers' workplace: The social organization of schools.* NY: Longman.

Schuttloffel, M. J. (1994). The technology integrated classroom and implications for teacher education. *Technology and Teacher Education Annual 1994,* Association for the Advancement of Computing in Education, Charlottesville, VA. 226-229.

Schuttloffel, M. J. (1998a). In search of the purpose of technology implementation. *Bulletin of Science, Technology & Society,* 18,(3), 247-260.

Schuttloffel, M. J. (1998b). "Reflections on the dilemma of distance learning," *International Journal of Educational Telecommunications,* 4, (1), 1998.

Schuttloffel, M. J. (1999). *Character and the contemplative principal.* Washington, DC: National Catholic Educational Association.

Sergiovanni, T. J. (1992). *Moral leadership: Getting to the heart of school improvement.* San Francisco: Jossey-Bass.

Smith, L. M., Kleine, P. F., Prunty, J. P., & Dwyer, D. C. (1986). *Educational innovators: Then and now.* New York: The Falmer Press.

Smith, L. M., Prunty, J. P., Dwyer, D. C., & Kleine, P. F. (1987). *The Fate of an innovative school.* New York: The Falmer Press.

Smith, L. M., Dwyer, D. C., Prunty, J.P., & Kleine, P. F. (1988). *Innovation and change in schooling: History, politics and agency.* New York: The Falmer Press.

Van Manen, (1977). Linking ways of knowing with ways of being practical. *Curriculum and Inquiry,* 6, (3), pp. 205-228.

Wolcott, H. F. (1995). *The art of field work.* Walnut Creek: Alta Mira Press.

Zachariades, I., & Killingsworth Roberts, S. (1995). A collaborative approach to helping teacher education faculty model technology integration in their courses: An informal case. *Journal of Technology and Teacher Education, 3*(4), 351-357.

Zumwalt, K. (1989). Beginning professional teacher: The need for a curricular vision of teaching. In M. C. Reynolds (Ed.), *Knowledge base for the beginning teacher* (pp. 173-184). New York: Pergamon Press.

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Frustration Among Educators About IT Use

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Abstract: In this paper we describe a research project in progress about IT use in education. Today educators feel frustrated about the way IT is adopted. In the paper we suggest how to initiate a discussion among educators to facilitate the start of a more substantial adoption of IT in educational practice.

Introduction and Background

An information society is emerging and information technology (IT) is an important part in this new society. The importance of IT is of course recognized in the Swedish education system. Community leaders, school boards, legislators, parents, etc., proclaim the value of this technology. Therefore, a large number of schools have an advanced infrastructure of computers and networks. By this, schools ensure that students are exposed to information technology since it will be a major part of their future lives. However, many teachers have no chance to assimilate and explore the technology on their own terms, and as a result of this, the use of IT in Swedish schools is limited. This is a problem.

We have a tough economy to deal with within the comprehensive schools, in Sweden. The resources allocated to schools depend on how many pupils there are and if the school has a need for extra money due to different kind of problems, e.g. dyslexia. Despite the advanced infrastructure it is a fact that each school still has to deal with choosing whether to buy new books to the pupils, or see to that there are enough pencils.

This is hardly anything unique for Sweden, but Sweden has come quite far when it comes to using IT in education. This means that the schools now also have to deal with how to afford to use the existing infrastructure with their already limited budget.

Schools receive funding to ensure that computers and networks are installed at the schools. However if the educators do not know how to use the new technology, it might even happen that the computers remain unpacked. Too often computers are used in the same way as typewriters.

The problem

The form of schools and education has remained fairly unchanged over hundreds of years, and so has the technology used in teaching, despite both pedagogical and technological influences.
Today the culture of the educational system and its technology is challenged. IT is here the main vehicle for implementing change and may help bring about some important reforms (Barker and Dickson, 1996). Just providing schools with an infrastructure, of computers and networks, will not have the desired effect.

It is not only IT itself that makes the chances. Educators need to know *how* to use IT, in a pedagogical well-grounded way. With the rapid development of IT this is certainly a dilemma and it is a *growing*

frustration among the educators. Those who are very enthusiastic about using IT also have to convince those who are skeptical about IT.

The educators are also instructed by the government to use IT, but the government does not say anything about how to find the time needed for reflecting upon this. Today, with the already heavy burdens for educators, there is certainly not enough time.

What has been done?

Below we give four examples what has been done in schools, about this undesired situation.

- There are several successful pilot projects that are working very well. Unfortunately they tend to be only pilot projects, not having a broad impact on the regular educational practice.
- Often the educators at a school are requested to take a *course* in the basic use of a computer, like word processing. Even though the educators learn something themselves, it is difficult to find that course relevant, compared to how you want to use IT as a pedagogical tool with your pupils. There are few courses made for educators with a pedagogical aspect on how to use IT with the pupils.
- Commonly one person at the school is appointed to be responsible for IT. This person is to be the link between IT, the field of applications and the educators. Normally that person has very limited education about IT and the support is therefore often quite poor. There is also a lack of time for working with these issues, even though it is well known that this area is very time wasting working with.
- Outsiders have tried to introduce IT into schools. After proclaiming its potential in the classroom, the educators use IT only slightly, if they do not really burn for using IT as a pedagogical tool. If they have not much knowledge about IT, it is reasonable to think that they find it time-consuming trying to understand IT while they have to do the daily work to. Above that they have to find out the pedagogical possibilities with IT.

What should be done?

With a situation as described above we claim that awareness of the problems with information technology in schools is necessary and that a structured interaction among teachers is a fruitful starting point. To gain commitment and firmly establish a constructive climate, all decisions must come from the educators themselves.

Therefore we suggest PIER (Nuldén and Scheepers, 1999a, 1999b) as an appropriate methodology to approach the problem.

PIER is based on four concepts: Problem based learning, Interactive multimedia, Experiential learning and Role-playing.

1. In problem based learning (PBL) the starting point of learning is a real world phenomenon or problem the learner wishes to understand or learn more about.
2. A great deal of attention has been focused on interactive multimedia, especially within the educational domain. Many educational institutions have produced different types of educational interactive multimedia courseware to replace or enhance educational activities.
3. Experiential learning refers to an encounter that the learner experiences and from this encounter learning is initiated.
4. By role-playing the participants use their own experiences and their assigned roles, while understanding problematic situations.

PIER follows four phases as outlined below. How PIER is applied in this research is described in the next section.

Phase one.	Experience. A group of people experiences a problematic situation through role-playing in a multimedia scenario. The duration of this activity is three hours.
Phase two.	Individual reflection. Duration one week.
Phase three.	Debriefing and discussion. The group meets together with the facilitator and discusses the situation presented in the scenario and further action is outlined. Duration two hours.
Phase four.	Using their experiences from phase 1 to 3, to start creating a change of the phenomenon or problem the learner wished to understand or learn more about e.g. how to use IT in the pedagogical best way at their school. A continuous learning-process.

Table 1: The framework of PIER.

Reflection is an important aspect of the framework for PIER. There are three different types of reflections that apply to the PIER methodology. First there is reflection-in-action, reflection that is made during the enacting of the scenario in activity one. Reflection on what happened during activity one, i.e. reflection-on-action, is done during activity two and is discussed at the seminar in action three. Reflection-for-action, i.e. thoughts about how to use the knowledge gained by the experience in a future situation are initiated during activity three.

PIER – in this research

PIER can be used to get the educators to engage in constructive discussions about IT use. In this section, we describe how PIER will be used with educators in Swedish schools.

Phase one - Experience

Between five and eight persons are role-playing guided by a multimedia-scenario. The participants can choose whether they want to play themselves in the scenario, if they want to hide behind their role character or a combination of those. The scenario is created specially for this group of participants, with their problematic situation about IT use, as a background.

The scenario begins with giving the group some information about where they are, what time it is and their role-character in this scenario; e.g. you are in your school where you work as the headmaster. It is in the beginning of the term and your school has been given 20 computers. Now you should use them in the best way. How?

The entire situation is similar to the reality at the participants' work place and by that the participants have to discuss together and try to find solutions about the same questions, as they have to confront every day. They also have to make a lot of choices during the scenario. For instance if they should use IT in every classroom or in a certain room? Who are allowed to use IT and what purposes should IT be used for?

During the scenario, multimedia is used to make things clearer; e.g. a video to show more information and guidance, virtual persons are saying controversial things and photos are shown to create a certain feeling in the group.

The scenario does not give the participants any solutions and it ends in a cliffhanger, abruptly, with more questions than answers.

Phase two – Individual Reflection

After the scenario the participants are left by their own, for about a week, to reflect on their experiences.

Phase three – Debriefing and Discussion

After a week the participants meet again to discuss the scenario – how they felt during the role-play and what happened. They also talk about their own daily situation at work and what can be done to change it. After the scenario the participants have got many ideas how to continue, and a plan for the future can easily be made.

Phase four - The Evolution of the Experiences Based on the Earlier Activities.

Further on, the plan for the future is the starting-point for using their experiences in their daily life.

How to continue

The scenario is not a solution by itself. It is a starting point for further discussions. When the questions the participants might have been thinking about for a long time, are raised during a three hours scenario, new questions are evolved and probably the further discussions will help them to find alternative solutions of the problems.

The effects continue to develop further discussions and less frustrated educators, but also that the participants have found new areas where IT is very useful as a pedagogical instrument.

Future work

The motivation for our research project is the fact that a large number of schools in Sweden have an advanced infrastructure of computers and networks, but the use is limited. In this paper it is suggested how to initiate a discussion among educators to facilitate the start of a more substantial adoption of IT in educational practice and by that making the educators less frustrated about IT use.

References

Barker, B. O. and M. W. Dickson (1996). A model for Infusing Advanced Technology into Teacher Education. Seventh International Conference of the Society for Information Technology and Teacher Education, SITE, Phoenix, Arizona.

Nuldén and Scheepers (1999a) Interactive Multimedia and Problem Based Learning: Experiencing Project Failure. Journal of Educational Multimedia and Hypermedia, 8 (2), 1999.

Nuldén and Scheepers (1999b) Experience and interaction in teaching escalation. To appear in journal of Interactive Learning Environments.

The Impact of Information and Communication Technology (ICT) on Job Characteristics of South African University Academics

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Abstract: A study was recently carried out on the use of Information and Communication Technology (ICT) by South African University Academics. The impact of ICT on job characteristics of academics - teaching, research and to a lesser extent, administrative duties was investigated. Academics at the University of Fort Hare, South Africa's oldest and first historically black institution (HBI) were tested in this exercise. Realizing that South Africa's HBIs exhibit a lot of commonalties in structure, operation and management, no doubt, this study strongly reflects the general situation with this country's HBIs. Academics across all disciplines and hierarchy were included in this questionnaire survey supplemented by interviews. Results indicate an established need for ICTs, a general lack of adequate computer facilities, low level of computer literacy among academics, a need for training in ICTs, high level of unreliability in networking allowing access to the use of the INTERNET, and the non-existence of ICT policies for computer equipment upgrades, hardware and software purchases and training. Albeit, it was evident from the study that academics with adequate knowledge of the use and application of ICT in their jobs did record significant improvement in the discharge of duties.

Introduction

The organisational world has over the past twenty years witnessed a revolution in work practices, brought about by developments in Information Technology (IT). Drucker (1986) describes present organisations as "information based" and those who work in them as "knowledge workers". The new IT, either computer-based, computer-related, or computer-influenced - today reaches into all kinds and sizes of enterprises, in every conceivable industry and specialized activity and with a multiplicity of options from which a user can choose whatever suits his particular needs. For many years, it has been quite clear that technology not only changes the structure and nature of organisations but also change the way people do their jobs and to some extent the way individuals in organisations view themselves in the context of the society (Irving and Higgins, 1991). Irving and Higgins (1991) went further to affirm that IT affects the nature, quality and perhaps the frequency of communication in an organisation. They explain that as more people become oriented toward terminals, communications may tend to be more impersonal through the use of the electronic mail.

Universities have been major users of computing since the latter first appeared. In recent years, they have also become leading users of networking. In the UK for example, the creation of JANET (Joint Academic Network) in the latter part of the 1980s encouraged a diversity of networking activities. At the end of the 1980s, a discussion of the "electronic campus" in the UK found no difficulty in reaching the conclusion that information technology (meaning especially the combination of computers and networks) would have an increasing impact on all the main strands of higher education - teaching, research and administration - during the 1990s (Brindley, 1989).

Several studies have been carried out in the past decade to look at the role ICT plays on University campuses. The way academics react to their institutions' ICT changing environment and the role this technology plays generally in University affairs have been issues researched in the past and still receiving attention. In developing countries, however,

the obvious problem of insufficient finances for the purchase of computer equipment cannot be overlooked. Many institutions cannot afford to provide either the equipment or the infrastuctural support, nor do they usually command the necessary resources of skilled manpower. However, some developing countries (sometimes distinguished as "third world", rather than the "fourth world") do have the potential for overcoming these obstacles in the foreseeable future (Bukhari and Meadows, 1992). Like Universities in developed countries of the world, many South African Universities are making the same kind of transition to ICT. The present paper investigates the impact ICT has on academics' job functions - teaching, research and administration - in South Africa's Historically Black Institutions (HBIs).

The Method

A survey was carried out at the University of Fort Hare with the use of questionnaires supplemented where necessary by interviews to determine a number of issues relating basically the University of Fort Hare academic, his/her job characteristics and role ICT plays in this regard. Specifically, the study determined:

- the level of accessibility of academics to ICT in the form of computers and internet connectivity;
- the level of use of ICTs;
- know-how regarding the use of ICTs;
- to what extent (if at all) ICTs influence their job functions - teaching, research and administrative.

This study we believe couldn't have been better timed, especially considering the financial state of tertiary institutions in South Africa, especially the HBIs. Its interesting to know also that donor agencies: the European Union, Cannon Collins Educational Foundation of the UK, Community H.E.A.R.T foundation of the UK, America's Andrew Mellon Foundation are among those actively contributing computer hardware among others products towards the development of tertiary institutions in South Africa. The significance of these technologies in the South African educational sector cannot therefore be over-emphasized. The questionnaire survey carried out by Igonor and Makalima(1999) involved the distribution of 40 questionnaires with a 95% response rate. Academics ranking from Professors down to Junior lecturers and tutors were surveyed in the exercise. The questionnaire tested areas such as -

- Information Technology available, in use and the extent of use;
- Information Needs of University Academics;
- Computer Literacy among academics;
- Relevance of Information Technology (computers and networks) in academics' operations and its impact on teaching, research and the performance of administrative duties.

The University of Fort Hare -
South Africa's First Historical Black Institution (HBI)

The University of Fort Hare has a strong missionary background. In 1878, there was a proposal by James Stewart of the Lovedale Institute for the establishment of a college of higher education for South Africa's black students. Due to the Anglo-Boer and World wars, the formation of this college was not until 1914. The college was taken over in 1946 by the Rhodes University in Grahamstown and was named the University College of Fort Hare. After the 1948 elections, Bantu education was extended to tertiary level and the college was

placed under the supervision of the University of South Africa. In 1970, the University College became autonomous and then named the University of Fort Hare. The institution is located in the rural town of Alice, in the Eastern Cape province of South Africa.

University Academics' Job Characteristics and ICT

Job functions of University Academics involve basically teaching, research and the performance of administrative duties. It is important that academics not only keep abreast of developments and current trends in their various fields, but also facilitate qualitative and up-to-date learning processes and produce lifelong independent fully baked graduates.

It is a cliché to say that university academics are by nature information-oriented. The quest for information is not new, it is characteristic of all people whether the need be articulated or not. In the words of Coggin (1979), access to information can be a matter of life or death for an individual. Information needs do not arise in a vacuum, they are constant, persistent by-products of life in modern society. Day-to-day need for information is always the child of a specific situation. With a changing, complex society, formerly simple solutions to information need become more complicated. Where to turn for expert information and how to determine which expert advice are questions facing many people today - academics inclusive. Saying that every society needs a basic minimum stock of usable information to survive will be understated. Every society needs to acquire, store and exchange this basic stock of information to allow it to survive. Similarly for the academic to carry out its obligations - teaching, research and administrative - access to reliable information is not negotiable. The means to getting access to this information is yet another challenge. Access knowledge and use of ICT in developed countries is seen as part of normal scenario in almost of every societal sector. In developing countries, including South Africa, the situation presents itself differently. Of particular interest is the case with South African black institutions that have suffered from apartheid government. Many Universities in developing countries, including these South African HBIs cannot afford to provide either computer equipment, or the infrastructure support; nor do they usually command the necessary resources of skilled manpower. However, coupled with the growing quantity of information are the development of technologies which enable the storage, retrieval and delivery of more information with greater speed to more locations than has ever been possible. Computer technology makes it possible to store vast amounts of data in machine-readable files and to program computers to locate specific information within data files. Telecommunications developments enable the sending of messages via tv, radio e-mail to bombard people with multitudes of messages. The Internet, a vast storehouse of information covering various subjects is also a by-product of this computer technology. Universities have in fact been users of this technology for a long time now. In fact, Woodworths (1991) argues that academic departments in colleges and universities have diminishing needs for typists and filing clerks as Local Area Networks, universal access to word processing, electronic mail and desktop publishing are introduced. In the words of Jungk (1972): In this world of change and complexity where the need for information upon which to base personal decisions is of greatest importance; in this world of huge amounts of information and sophisticated technology to help in retrieving and delivering the exact information needed; in this world which is entering a post-industrial age or knowledge-based era; in this world of the 1980s, "information, its lack and availability, its use and misuses, its treatment and transfer and last but not the least, its possession may well be a crucial factor in our evolutionary crisis".

The importance of information for the survival of the university academic cannot truly be over-emphasized and the means to having access and succeeding in this regard very well depends on the capabilities of information and communication technologies. Those people who have accurate, reliable and up–to-date information to solve day-to-day problems, the critical problems of their business, social and family life, not to mention academics' need for research and teaching, will indeed survive and succeed. "Knowledge is Power" - the truest saying of the 80s may well be true for the 90s, and access to information (thanks to ICTs) may be the most critical requirement of all people.

Result

IT available and in use

The available IT tools and in use from the result of the survey is summarised in table 1 below:

IT Tools available	Number of users	%	Number of non-users	%
Computers	31	81.6	7	18.4
Telephone	38	100	0	0
Mobile phone	32	84.2	6	15.8

Table 1: IT available and rate of use.

While the above table reveals IT tools available, the state of these technologies is yet another issue which might just not be part of the scope of this report. 81.6% of academic staff members make use of computers in their jobs. The percentage of non-users (18.4%) may be due to a number of reasons; notably - no access to computers, or that they possess their personal computers and would rather prefer to work from them, or do not possess sufficient knowledge to use computers and are therefore not bothered. No doubt, academics need computers in order to function effectively and efficiently. Eraut (1991) well supports this arguing that IT has several effects on teaching, because of the availability of vast amount of data and also increasing need for proper education in putting the information to intelligent use.

The computers available to academics are used for a variety of purposes. The survey revealed that academics need computers

- for teaching purposes; word processing lecture notes, calculating student scores and r administrative purposes;
- for Internet connection; the Internet is indeed rich in a lot of information and academics need access to this fastest growing database. Information on research done in various parts of the world and teaching methods can all be accessed here;
- to link library online public access catalogues via telnet;
- access CD-ROMs and also other online journal databases;
- to communicate with the use of the electronic mail system. Electronic mails are used for exchanging information between colleagues, friends and families within and outside the institutions;

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- Computers linked to the Internet provide a fast and easy access to reliable and up-to-date information.

Mwawenda (1997) clearly states that research; publication, teaching and administration are some of the functions of academics, with research being the most important. Atkin (1991) further stresses this, arguing that research has been identified as not only a primary function of a university but also an integral aspect of the work of academics. In a world where research and publications are used as criteria for promotion and the determination of the best academics, the potential of the computer in making available information tappable cannot therefore be over-emphasized.
The table below quickly indicates the proportion of work done by academics using computers.

Task	No.	%
Exchange of e-mail messages within the university	26	68.4
Exchange of e-mail messages outside the university	29	76.3
Exchange of data with colleagues within and outside the university	21	55.3
Statistical analysis of data	13	34.2
Word processing	26	68.4
Searching online databases	21	55.3

Table 2: Proportion of work done on computers and the rate of usage.

The value of the e-mail to the academic is most reflected in the following ways:

- an enhancement of the freedom of expression among employers and employees;
- saves time;
- saves costs;
- fosters communication between staff and students;
- unlimited in potential audience size;
- breakdown of bureaucracies associated with communication.

Computer Literacy among Academics

Table 3 below gives an indication of computer literacy among academics surveyed in this study.

	No. of respondents	%
No knowledge of computers	1	2.6

Little knowledge	4	10.5
Basic knowledge	23	60.5
Extensive knowledge	10	26.3
Total	38	100

Table 3: Level of computer literacy among academics

The table above indicates that academics have a slightly above average knowledge level of computers and their use. Basic knowledge in this case refers to performing of basic tasks such as word processing with Ms-word and Word-perfect, use of e-mail and very little knowledge of information searching and retrieval form the World Wide Web. As already mentioned, most developing nations lack the required capacity to train and develop adequate human resources. Computer literacy training among academics is a necessity otherwise they 'd be left behind as new computer technologies evolve. Computer literacy skills are essential skills for academics especially as the society has come to depend on electronic text. Skills such as finding, manipulating and scanning electronic documents as well as word processing, Internet use and typing are basic training components to be covered here.

ICT and its relevance in teaching, research and the performance of administrative duties

The relevance of ICT in the operations of academics is manifest in a number of ways. ICT has made it possible for academics to have access to online journals, the online public access catalogues (OPAC) of libraries, the world wide web and also CD-ROM accessible databases. Some of the questions we sought answers for relating this section of the study included:

- In what ways has ICT influenced individual access to information?
- Does ICT in any way influence academic-related decision-making issues?
- How does ICT then impact on academic performance in terms of job efficiency and effectiveness?

Questions of this nature are quite unlimited, but we do know that it's an established fact that academics' do need information to survive. The relevance of the World Wide Web in meeting the needs of academics cannot be totally explored. The Internet which was initially developed by the United States Military, has now grown from a tool of small group of scientific researchers to development of substantive sites covering a breadth of topics useful for teaching, research, entertainment, to mention a few. Types of materials covered include secondary, teaching, and reference and news sources. With the availability of scientific journals, online, several functions or observations could be emphasized -

- it makes it possible to build a knowledge base. Journals serve the most basic functions of science; the creation of published core of knowledge for public availability.
- easy communication of information. Everyone publishes his or her work to be read, confirmed, praised, cited, analysed and commented on in future works. By so doing, the functions of building a knowledge base and communicating information become a part and parcel of one whole function.
- helps in the validating of quality and the distribution of rewards.

Without ICT, the academic does not have access to all these. Academics generally accept and identify with electronic journals due to their credibility, accessibility and permanence made possible by the wonders of ICT. The evolution of new ICTs has led to the development of web-based teaching, the emergence of fully dedicated web courses and course homepages that provide links to supplementary materials.

Conclusion

The relevance of ICT in academic teaching, research and the performance of administrative duties is no longer an issue of debate. Major problems facing developing countries include the lack of adequate funds to acquire these technologies, a shortage of skilled manpower to run and train people in this technology and poor maintenance of existing technology.

References

Brindley, L. (1989). *The Electronic Campus,* British Library, London.

Bukhari, A.A. and Meadows, A.J. (1992): *The Use of Information Technology by Scientists in British and Saudi Arabian Universities: A Comparative Study. In Journal of Information Science: Principles and Practice 18(5).*

Coggin, M. (1979). *In Information Needs of the '80s*, ed. By Robert Stueart, p. 1-15

Eraut, M. (1991): *Education and the Information Society: A Challenge for European Policy*, Cassel,
292 pp.

Jungk, R. (1972). "*Evolution and Revolution in the West*" In the Futurists, ed. By Alvin Toffler. New York: Random House, p.75.

Makalima and Igonor (1998*): Information Technology Use and its Impact on Job Characteristics of Academics: A Study of the University of Fort Hare, South Africa.*

Woodsworth, A. (1991). *Patterns and Options for managing Information Technology on Campus*,
American Library Association.

Building the Capacity for Systematic Integration of Technology in Teacher Education

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Abstract: Funded through the U.S. Department of Education, Project PICT (Preservice Infusion of Computer Technology) was developed to enable preservice teachers to fully utilize modern technology for improved learning and achievement in their future classrooms. To achieve this goal, the Bowling Green State University (BGSU) Technology Consortium developed a model grounded in the collaboration between teacher education faculty, arts and sciences faculty, and K-6 teachers. Primary project outcomes are: revised teacher education curriculum that reflects the ISTE technology standards; faculty Technology Training Model that prepares faculty to infuse technology in their teaching, model effective technology uses, and provide opportunities to observe technology-rich K-6 classrooms; Teacher Education Technology Infusion Model that systematically integrates technology in teacher preparation courses; system for assessing preservice teacher technology competencies; evaluative data on the impact of the pilot programs; collaboration with technology-rich K-6 schools, expansion of consortium partners; and grant proposals for future funding.

Introduction

A mission of the College of Education and Human Development at Bowling Green State University (BGSU) is to prepare reflective, creative and competent teachers for the new millennium. Essential to this mission is the development of preservice teachers who are not only technology literate but able to integrate technology into their instruction so their students will develop the ability to use technology throughout their lives. Currently BGSU teacher education programs produce approximately 750-800 graduates per year, many of whom are from rural Ohio and often return to the same rural areas to begin their teaching careers.

For the past decade, Bowling Green State University has struggled to educate the preservice teachers so that they will gain the competence needed to utilize technology in their classrooms. Due to the rapid advance of technological changes and limited financial resources, for many years, the major effort to achieve this goal has been restricted to a required technology methods course typically taken during the junior year. This course has most often been taken in isolation of any clinical experience that would provide the opportunity for students to utilize the skills being learned in an instructional setting with children. Additionally, most preservice teachers have not experienced technology integration in their other education courses and have not had the opportunity to observe and teach in technology-rich K-12 classrooms. Barriers that have impeded such technology infusion include: inadequate resources to purchase hardware and software for university classrooms and surrounding K-12 schools; lack of technology competency and professional development opportunities among teacher educators and classroom teachers; and lack of programmatic alignment with the International Society for Technology in Education (ISTE) standards across the curriculum, both at the university and elementary/secondary school levels. Another issue that has complicated the matter is the lack of technology experiences that many of BGSU's teacher education students bring to college as many of these preservice

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teachers are from technology-poor rural/low income areas in Northwest Ohio. Since many of these same students return to these areas for teaching positions, BGSU has a unique opportunity to impact these rural/low-income schools by returning these students as technology-using educators.

Recently, the lack of hardware in K-12 classrooms has been addressed by the Ohio SchoolNet Initiative while BGSU is investing in more equipment on the university campus. Ohio SchoolNet has installed typically three to four computers in most elementary classrooms throughout Northwest Ohio with plans to expand installation to secondary classrooms in the near future. BGSU recently has committed to installing three permanent and one portable electronic classrooms to promote faculty infusion of technology. These classrooms will be located in the College of Education and Human Development and will serve as models for the university. Unfortunately, while technology access has increased for education faculty, most instructors lack the skills and understanding to adequately infuse technology into their teacher preparation courses. In addition, the current teacher education programs do not facilitate the systematic infusion of technology throughout the curriculum. Consequently, both program restructuring and professional development training have been needed to facilitate technology infusion throughout the preservice teacher experience. The BGSU Technology Consortium is currently implementing Project PICT (Preservice Infusion in Computer Technology) that will address these needs by restructuring the current teacher education programs, piloting a faculty technology training program, and piloting a technology infusion program.

Project Design

The overall goal of Project PICT is to enable preservice teachers to fully utilize modern technology for improved learning and achievement in their future classrooms. To achieve this goal, the BGSU Technology Consortium proposed a model grounded in the collaboration between teacher education faculty, arts and sciences faculty, and K-6 teachers. (Note: First year implementation has focused on the elementary education program since equipment acquisition for Ohio K-12 schools has been primarily limited to elementary schools). Consequently, representatives from these three entities have worked in teams to restructure the current teacher education programs and begin implementation of a technology-rich teacher preparation curriculum. Participants for this first year included: six (6) university methods faculty, ten (10) K-6 teachers, and two (2) arts and sciences faculty. Participating faculty and K-6 teachers were required to attend the following: 1 day workshop on ISTE standards, 2 day workshop on technology planning and infusion, team meetings, and 5 training sessions. Participants were also expected to create team and individual technology plans, revise curriculum, and implement at least 2 technology lessons/units in the Spring 2000 semester.

Objectives that guided Project PICT include:

1. Conduct a needs assessment of faculty technology competencies and level of integration;
2. Restructure existing teacher preparation curriculum to systematically fulfill ISTE/NCATE technology standards for all teachers;
3. Develop a system for assessing preservice teacher competencies of ISTE/NCATE standards.
4. Establish consortium partners that will enable BGSU to fully implement its technology integration program;
5. Facilitate cross-disciplinary collaboration between BGSU faculty and K-6 schools;
6. Pilot technology training program:
   a. Create teams of instructional and clinical education faculty;
   b. Provide educational (instructional and clinical) and arts & sciences faculty with training on ISTE/NCATE technology standards for all teachers;
   c. Provide educational (instructional and clinical) and arts & sciences faculty with training on how to integrate technology in course instruction and model effective technology use;
7. Pilot technology infusion program:
   d. Provide preservice teachers with opportunities to observe and experience technology rich K-12 classrooms that represent a variety of socio-economic and population levels through video-conferencing and field placements;
   e. Provide preservice teachers with opportunities to observe, experience, and use technology within their college courses;
   f. Provide preservice teachers with technology mentors in their K-12 field placements (clinical faculty/participating K-12 teachers will serve as technology mentors).

Evaluation

Project PICT has been subjected to rigorous formative and summative evaluation in order to establish clear benchmarks for documenting impact of pilot implementation and future improvements. Quantitative and qualitative methods have been conducted to permit periodic assessment of progress toward achieving outcomes. Specific variables to be measured among teacher education faculty, both instructional and clinical, are: technology competency, level of technology integration (frequency, type, and quality), perceived barriers of technology integration, training preferences, impact of training program, perceived impact of Technology Infusion Model on preservice teachers. Specific variables to be measured among participating preservice teachers are: technology competency, experiences with technology in courses and field placements (frequency, type, and quality), perceived barriers of technology integration, training preferences, impact of Technology Infusion Model on preservice teachers, and changes in one's vision of a technology-rich classroom. Measurement of these variables will occur through the following data collection methods: pre/post surveys for faculty and preservice teachers, focus group interviews with faculty and preservice teachers, observation of technology-rich lessons in the education and K-6 classroom, content analysis of preservice teachers' products (course assignments, lesson plans, unit plans), content analysis of faculty products (revised curriculum, course syllabi, lesson plans). Control groups have been developed to allow for comparison between participating and non-participating preservice teachers as well as participating and non-participating faculty.

Integrating Technology into Preservice Teacher Education Method Courses: A Unique Business/University Partnership for Staff Development

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Abstract: Recognizing that changing teacher education is a key requirement for changing K-12 teacher practices, Apple Computer developed the Apple Summer Institute for Teacher Education, more commonly referred to as "Camp Apple" by the 42 participants who represented faculty teams from 17 universities. This panel discussion is focused on the results of this novel program in promoting institutional change within participating universities, including results of the project-based learning sessions, reports on how the training influenced classroom practice and institutional change by participants, and recommendations for improving faculty development programs based on evaluation of this first-year effort.

I: From Camp Apple to Classroom Practice: A New Model for Staff Development

Recent studies have indicated that the best predictor of the skills that teacher education graduates have in infusing information technology (IT) into instruction is IT use in coursework throughout their preservice program. As a result, these studies have included strong recommendations to ensure that technology is a key part of methods classes so that future teachers understand and are able to integrate technology within the disciplines that they will teach (Cooper & Bull, 1997; International Society for Technology in Education, 1999; National Center for Education Statistics, 1999; National Council for Accreditation of Teacher Education, 1997; Willis & Mehlinger, 1996). Meeting this challenge requires new models of faculty development that deal with the barriers which have been identified as inhibiting past efforts in changing practice through training: motivation, resource access, and time.

Recognizing that changing teacher education is a key requirement for changing K-12 teacher practices, Apple Computer developed the Apple Summer Institute for Teacher Education, more commonly referred to as "Camp Apple." In July 1999 Apple Computer conducted a one week, residential professional development institute for teacher educators which attempted to address this challenge. Deans from schools and colleges of education had advised Apple that the professional development of their faculty, particularly of the methods faculty, was a primary concern. "Camp Apple" was designed in conjunction with 17 teachers' colleges in the U.S. and Canada to meet this need. While Apple has provided a camp experience for K-12 teachers, administrators, and technology support professionals in previous years, this was the first camp program that was aimed at higher education faculty.

The goals of Camp Apple were (1) to develop technology skills among faculty who rated themselves as novice computer-users, (2) to provide opportunities for them to consider how technology might enable more constructivist methods for their own courses, and (3) to give them time to reflect, share, and apply their new learning with colleagues from across North America.

Camp Apple was conducted in a rich technology environment. Participants had access to cutting-edge technologies like high speed Internet connections, three full labs of iMacs and G3 computers along with printers, digital cameras, scanners, authoring and educational software, and a wide variety of peripheral devices which are used in specialized disciplines for teaching and learning. The staff at Camp Apple were Apple employees and IT directors from Colleges of Education who had previously been recognized as "Apple Distinguished Educators."

Attendance at Camp Apple was "by invitation only." The deans on the Apple Advisory Board were invited to send teams of methods faculty from each of the four core curriculum areas (social studies, English/Language Arts, Science, and Math) to Camp. Each institution was responsible for the travel expenses of their participants; Apple paid for the training costs, room, and board. Forty-two methods faculty from 17 different institutions attended. Three deans also attended.

Apple's corporate goals for sponsoring this program were (1) to better understand the elements of successful professional development for teacher educators, (2) to cultivate a cadre of faculty who would apply the kinds of constructivist methodologies which are best supported by technology in their courses, and (3) to create a professional development model which could be easily replicated by other teachers' colleges at their own sites.

The Camp Apple Model

Several of the professional development strategies implemented at Camp Apple seemed to have combined to create a unique experience: a residential program in a scenic and secluded location with "24/7" access to cutting-edge technology; a reliance on collegial teams; and a focus on pedagogy. Finally, the longer-term effect of Camp Apple, as measured by the various dissemination activities of its participants, seems to have come from the "partnership" premise established between Apple and the participating institutions.

Location, Location, Location: Located in the Marin foothills just north of San Francisco, Camp Apple was conducted at Walker Creek Ranch. The ranch is an outdoor environmental education facility owned by the Marin County Board of Education. Cell phones cannot reach this canyon location and Walker Creek has no television. The residential aspect of the program promotes collegiality amongst participants in a way that "commuter" experiences cannot. Anyone who ever went to summer camp knows how powerful a "24/7" communal environment is on developing new friendships.

Focus on the Pedagogy, Not the Technology: The primary goal (and the greatest challenge) of Camp Apple was to focus on pedagogy, not on technology. While it is necessary for faculty to develop competence in the technology, it is more important for them to investigate the pedagogical relevance of these resources for teacher education. With access to expanded technology resources, faculty were free to experiment, explore new possibilities, and reflect on their teaching. Using the "Unit of Practice" (a curriculum development framework created by the ACOT research team), participants spent the week learning new technology skills, discussing teaching issues with colleagues, and developing a new teaching module for their methods courses. Finding the balance between these competing demands—developing the skills, considering the implications (of the technology), and creating a meaningful implementation was challenging and at times frustrating for both participants and staff. Further research will reveal whether these three ob-

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jectives can be reached simultaneously or whether there is an evolution of thought and practice which is sequential.

The Importance of Teams: Drawing from our professional development research in the ACOT schools, we knew that teams were critical to the success of the program, both in the short and long term. Teams were used in two ways to achieve our goals. First, faculty worked in curriculum-area teams during the week on their curriculum development projects. Consequently, new collegial relationships formed around the common goals of learning and creating new materials for their courses. Participants were able to learn from new friends and share this learning with the team from their own institution. In order to insure participants would apply what they learned when the Camp concluded, individuals met as university teams before they left to plan follow up activities for the fall. Participants were asked to extend their learning to their students, to others at their schools, and to the broader teacher education community through new publications and research based on their Camp Apple experience.

Partnership: Apple's explicit goals for sponsoring this program relied heavily on the commitment of the participants to apply what they had learned at Camp to their teaching. It relied on their interest in continuing the conversation with others—in their own institutions and beyond. To achieve this, each participant committed to creating two more Units of Practice for their courses during the Fall semester and publishing them on Apple's online teacher network, the Apple Learning Interchange. They also committed to at least one dissemination activity. This could be new research, a publication, a conference presentation, or other leadership activity which would further the discussion of technology in teacher education.

Unlike many professional development experiences which are soon left behind in the wake of everyday demands, the follow up activities of these teams have been extensive. In addition to the individual work by faculty back on their own campuses, local teams have been able to draw on Apple resources for continued support. As a result, the Camp Apple program continues to produce ongoing change. Two of these are explored in the following sections by Joyce Morris of the University of Vermont and Christy Faison of Rowan University.

II. How I Spent My Summer Vacation and Ended Up Changing the World

Journey of a Thousand Miles

To many higher education faculty the prospect of learning new technology is a journey of a thousand miles. They are expected to use and integrate technology to increase their own efficiency and model it for future teachers even though these technologies were non-existent when they were students. Experts in their respected fields, they are often novices when it comes to using new technology, yet government and public mandates are calling for the infusion of technology in all preservice coursework (International Society for Technology in Education, 1999; National Council for Accreditation of Teacher Education, 1997; Thompson, 1999). In their national survey on information technology in teacher education, The Milken Exchange reported, "...the technology infrastructure of education has increased more quickly than the incorporation of IT tools into teaching and learning," and that "many faculty do not model technology use..." (International Society for Technology in Education, 1999, p. 2). There is a growing consensus that the integration of information technology into the teaching/learning environment can best be addressed through advocating and role modeling (Office of Technology Assessment, U.S. Congress, 1995). Advocacy implies showing others how technology can be applied to advantage in their teaching by role modeling the use of technology to achieve this objective as well as demonstrate the personal and professional benefit to be derived from its use (Wright, 1993).

People adapt to innovations in different stages (Hall, Loucks, Rutherford, & Newlove, 1975). Each level is characterized by observably different behaviors related to the user's development in acquiring these new skills and level of using the innovation. Research by ACOT discovered levels of use are also characteristic of adaptation of computer technologies by teachers in their classroom (Sandholtz, Ringstaff, & Dwyer, 1990). The Milken Exchange has aggregated these into five stages—(1) entry, (2) adoption, (3) adaptation, (4) appropriation, and (3) transformation—in a Professional Development Continuum (http://www.milkenexchange.org/pdc/pdcdocs/pdcII.pdf). To model technology fluency one must feel comfortable with basic computer skills, the focus of the entry stage. At the adoption and adaptation level, technology is somewhat integrated into existing practices. In the final stages, appropriation and transformation,

technological tools are used as a catalyst for significant changes in learning practices. At the adaptation level, technology is thoroughly integrated into existing practices. The final stage, transformation, uses technological tools as a catalyst for significant changes in learning practices. One advances to another stage through practicing skills, using the technology in a supported environment, professional development, and networking with colleagues to determine best practices.

To enable faculty to use technology at an adaptive and transformative level requires reallocating resources and providing time and support to learn the technology that will enable them to systematically redesign programs, curriculum, and field experiences that capitalize on the power of these tools. We know what to do, the problem lies in how to pragmatically implement a retooling of our faculty while we teach, research, and serve our local communities. We face many of the same problems the K-12 community has been facing—how do you redesign a machine without ever shutting it off?

From Camp Apple to Campus

When the opportunity for four elementary education faculty to attend Camp Apple was extended to our program at the University of Vermont in summer 1999, faculty jumped at the offer. They would give up a week of their summer vacation to learn, explore, and play with technological tools and think about how they could infuse technology into their teaching.

Faculty returned to Vermont energized with visions of ways to infuse technology into their teaching, assignments, activities, and presentations. Depending on their level of comfort in using technological resources, faculty are using their learned skills. One professor who coordinates the elementary education program and teaches a reading course to preservice teachers was the most insecure about her technological competence. Since her visit to Camp Apple, she has set up a listserv for our program that she is managing and facilitating, and for the first time, has prepared a presentation for a National Reading Conference using PowerPoint. She is in the process of designing a telecommunication project with her third year preservice students and Vermont elementary school children as an extension of the WEB project, a preexisting program connecting public school children with mentors. Next semester her preservice students and a group of elementary students will read selected children's stories and use a web board to discuss different issues surrounding the stories.

A second professor teaches a literacy course for third year students and a portfolio development course for seniors. In 1995 the State of Vermont implemented a results-oriented program approval process for teacher certification—evaluation by portfolio to be initiated at institutions of higher education that serve those preservice students (VISMT, 1995). In this professor's literacy and portfolio courses he has introduced Inspiration, a concept mapping program, to his students to help them visually and textually organize their portfolios through themes of practice. At the University of Vermont, professional portfolios must be organized as a text, via themes, with student selected documentation that describe the emerging teacher. State and Program criteria are located in appendices and cross-referenced with their documentation. Students collect, select, and connect their artifacts and caption the pieces to explain the context and relevance of evidence. Preservice students are expected to relate educational theory to practice, drawing upon their coursework, fieldwork, and community experiences to create personal profiles. Students are encouraged to use the power of multimedia to construct electronic portfolios to document this portion of their certification. It is anticipated that with increased resources, all students will establish their portfolios electronically.

The third professor to attend Camp Apple is a partner in the literacy team and had a fairly good level of computer literacy before her summer experience. She previously connected with a fourth grade teacher in one of our field sites and arranged a telecommunication project, where through e-mail, preservice students read and discussed multicultural stories in common with fourth graders. For her camp project she created a model for adapting literacy portfolios that preservice students create in their third year, to an electronic format. Through a local network, students document and critique elementary student work and share feedback with each other. In our fully networked transformable classroom, laptop computers are delivered to allow students to upload their files, practice file sharing, and create running records of student work that they examine in their field experiences. These are critiqued and shared by groups of students and incorporated into literacy portfolios.

The fourth professor is introducing a HyperStudio assignment for third year students into the Inquiry Block, an integrated science, social studies, and art methodology course in which she teaches. Our preservice students have previously used HyperStudio in a first year required computer course. In this assign-

ment students develop multimedia hypertext stacks that teach a science concept to accompany a science center that all inquiry block students build and leave in their field placement classrooms for two weeks. Science Centers must be self-sufficient with activities and assessments about science content and processes. Creating a multimedia based resource helps preservice students demonstrate their ability to develop grade-appropriate content, organize information in a logical interesting way, and use technology tools to present this to an elementary audience. Many of our neighborhood schools already use HyperStudio and for those that do not, the stacks will be uploaded to the Internet for viewing.

The Impact

The impact of Camp Apple far exceeds its effect on these four faculty. At the beginning of the semester thirty-two faculty throughout the college attended a set of three conversations about the Camp Apple experience and how we move forward with technology. Two of these meetings were attended by the College Dean and Vice Provost of Information Technology at the University. Faculty voiced their concerns about adequate resources and the lack of a clearly articulated vision and plan. This has resulted in a newly formed technology task force of faculty widely representing the college and being facilitated by a respected K-12 technology educator. The task force is taking a serious look at a number of issues and for the first time we are working together to define what it means to be a teacher of twenty-first century teachers. We are working together to define how this new literacy in technology and learning will help us develop practitioners that know how to use all the tools available to them and will be prepared to teach children brought up in the net generation.

Camp Apple provided the impetus for a number of changes we are already beginning to see in our college classrooms and administrative attention. This experience carved out the time to learn how to use new technology, to explore technology in a richly supported environment, and to think about what and how we teach and how technology could and should change that. There was structure to provide focus with flexibility to accommodate our special needs and interests. Our summer experience encompassed a definition of professional development that goes beyond the term "training" with its implications of learning skills, and incorporates a definition that includes formal and informal means of helping faculty not only learn new skills, but also develop new insights into pedagogy and their own practice. Camp Apple helped faculty see where their thousand mile journey could end and took us a few hundred miles towards our destination in a week.

III. Replicating Camp Apple Locally: A Professional Development Model

Starting with Camp Apple

Ongoing professional development for faculty in teacher education has been and continues to be an integral part of the climate and culture of Rowan University's College of Education. In the past five years, efforts have focused mainly on improving technological literacy and more recently, on the integration and modeling of instructional technology in the professional component of our programs. Past activities have included workshops on the use of productivity tools, specific software packages, and presentation programs. These activities have met with moderate success. However, those workshops/experiences that provided little or no follow-up, were 'demonstration only,' and/or involved technology that was not accessible or reliable were more frustrating than helpful. In a continued effort to enhance the technological abilities of teacher education faculty and keeping those concerns in mind, the associate dean attended the week-long summer institute for teacher educators known as Camp Apple during the summer of 1999. Using the 'Camp' model as a turnkey, professional development activities were planned that could be replicated for

Back at Rowan University

Many challenges had to be faced in replicating the Camp Apple model. These included: a) finding an appropriate time during the semester that was convenient for the majority of faculty, b) ensuring that facili-

ties/hardware were adequate to accommodate the number of attendees and types of activities to be undertaken, c) determining a topic that would be useful across various education departments (elementary, secondary, special education, health & exercise science, reading, and educational leadership), and d) motivating faculty to participate. We faced two additional challenges in planning an activity. First, an existing computer lab in the College of Education was to be upgraded during the summer of 1999, but as of the start of the semester, no action had been taken. The second was that the College was slated for an upcoming NCATE continuing accreditation review in the fall and all attention and effort was focused on the visit. Given these concerns and circumstances, the associate dean met with the instructional technology specialist several times during the semester to determine an appropriate course of action.

Fortunately, the computer lab in the College of Education was renovated and upgraded during the first week in October, and the NCATE visit followed two weeks later. Those two challenges being met, planning for the professional development activity continued. The January intersession was chosen as the time for Camp Apple since no classes would be in session, yet faculty would be returning to campus for registration and to prepare for the spring semester. The Camp Apple theme (i.e., casual attire, bag lunches, technology counselors, and give-aways) would be used as a motivator to attract participation. The focus of the professional development activity would be to introduce education faculty to WebQuests—inquiry-oriented activities in which some or all of the information that learners interact with comes from resources on the Internet (B. Dodge cited in Schrock, 1999). This activity was chosen because it could be used across all education departments by professors, and in turn, incorporated by education candidates for use with K-12 students.

In addition to the overall camp theme, other components of the week-long institute would be incorporated into the campus-based professional development component. One positive aspect of Camp Apple was the ready access to technology specialists during the hands-on workshops. This would be accomplished by having "technology counselors" available during the workshop to provide assistance as needed. As in the Camp Apple model, faculty members would be encouraged to work in teams on projects using their existing course syllabi. Faculty would be introduced to a modified Unit of Practice (UOP) as a model for incorporating technology into their education courses. The session would be divided into two components—a "minds-on" session where faculty would be introduced to, and discuss the value of WebQuests, and a hands-on session where faculty would develop WebQuests appropriate for their courses. Follow-up would be an important component to the success of the professional development activity. To that end, the instructional technology specialist will develop a web site where education faculty can share their WebQuests, and seek support and/or assistance in the integration of this technology strategy. The site will also be a resource for links to other WebQuest sites. In addition, the technology specialist who authored the text used by all of our teacher education candidates (Orlando & Levy, 1998) will add a new chapter on WebQuests to the revised text to encourage preservice candidate use with K-12 students.

In order to promote participation, flyers were distributed to all education faculty and announcements were posted on the College of Education web site. The Dean of the College of Education agreed to supply funding for refreshments and give-aways. The college instructional technology specialist, and a university instructional technology specialist (with an education background) volunteered to be technology counselors. The only perceived obstacle to success was the timing of the workshop. Although classes would not be in session, faculty would be on "holiday," so participation might be limited by those who already had plans for this particular timeframe.

The goal of the workshop, which is to be held January 10, 2000, is to explore with faculty meaningful ways to integrate technology into professional education courses using hands-on experiences. The specific objectives include the ability to: a) define and construct WebQuests, and b) evaluate existing WebQuests and Internet sites. The intended outcome is to increase the likelihood that education faculty would incorporate and model the use of technology in their education courses using the WebQuest activity as an instructional strategy. If this particular strategy is successful, participation in future workshops would be expanded to include all university faculty, so that the modeling of technology use would be evident campus-wide. Another potential strategy would be to replicate the Camp Apple experience for inservice teachers at our partnership and PDS schools.

Our education faculty have shown a consistent interest in enhancing their professional skills. Likewise, a culture exists which promotes and supports faculty professional development. Rowan University's Camp Apple will be another wonderful opportunity to assist the College of Education in the preparation of excellent teacher candidates, ready for the classrooms of today and tomorrow. Teacher education is touted as a

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major factor in improving K-12 education. Skilled and talented teacher educators can be the catalysts in meeting this necessary goal.

IV. Evaluation: What did We Learn?

Participants were asked to provide Apple with a written reflection evaluating their experience at Camp at the end of the week. In addition, a follow-up survey was done three months later with plans for continuing evaluation in the future. Remarkably, evaluations were very consistent. Where the program succeeded, participants acclaimed its success. Where the program required more work, participants' comments were consistently critical.

Technology Integration: It's Not What You Think It Is: The most significant learning from the week was the realization that technology integration means different things to different people. It is really two issues.

When faculty think about "technology integration" in their teaching, they are usually thinking about things like using email to communicate with students, moving their lecture notes to electronic slides with software like PowerPoint, or putting their syllabus on the web. When educators talk about "preparing tomorrow's teachers to integrate technology" for K12 instructional use, they are talking about instructional strategies which use technology to promote critical learning processes in children. We discovered that one has to separate the use of technology for professional productivity by the faculty member and modeling instruction to promote new learning outcomes which employ technology. That a faculty member puts his or her syllabus on the web as a way to "model" technology usage for preservice students will not help those preservice teachers teach more effectively in their future classrooms.

Bringing Effective Practices to Teacher Education: There is a great opportunity for teacher educators to explore effective practices for their own teaching. Many of these effective practices are constructivist in nature, and require technology in order to make them most effective. While we erred at Camp Apple by presenting effective practices *in the context of K12 instruction*, it became immediately clear that faculty were very interested in exploring the potential of strategies like simulation, project-based learning, collaborative learning, and group learning within the context of their courses. Professional development for teacher educators should provide participants with the opportunities to explore these possibilities. If preservice teachers have these kind of first-hand learning experiences, they will come to implicitly understand the power of technology in teaching. This is the kind of "modeling" that needs to take place in teacher education when we talk about "technology integration."

Follow-Up Survey

A follow-up survey of all participants three months after the program asked them to assess how their Camp Apple experience was making a difference in their current teaching and practice, and what activities they had engaged in to fulfill their commitment to disseminate what they had learned. We received 23 responses to this survey (51% return rate). In their retrospectives, participants uniformly praised several aspects of the Camp Apple model, including the residential, secluded location, the outstanding staff, and the availability of cutting-edge technology.

Residential, Secluded Location: In their evaluations of Camp Apple, we learned that the residential aspect of the program was the most powerful strategy employed. Participants also reported that the secluded and scenic location created a wonderfully relaxing environment in which they were able to focus intensely on the subjects at hand. Faculty were unanimous in their evaluation of Camp Apple for giving them the opportunity to spend such a long period of time in the company of colleagues to discuss issues and share ideas.

The Right Staff: Camp Apple was staffed by Apple employees and instructional technology directors who had previously been designated "Apple Distinguished Educators" from several Colleges of Education. They were all experts in a particular technology or in a particular implementation of a technology for teaching, like simulation, multimedia authoring, or process-learning. Evaluations from participants ranked the staff as the single most significant factor in the success of Camp. We tried to provide both direct instruction as well as just-in-time learning. The broad technical expertise of each staff member made this possible.

Technology Immersion: Participants remarked that the technology-rich environment at Walker Creek made them feel like they were "kids in a candy shop." There were technologies and software products available to them that they did not know existed. The ability to have round-the-clock access to these resources combined with the expertise of the staff was one of the key points of feedback in favor of the program.

Teams At Work: Participants who attended in teams of three or more had a significantly different experience than those who came by themselves or even in a pair. Of the 42 participants, 40 reported that they would recommend Camp Apple to a colleague. The two who said they would not have attended came as "solo" participants, without a team. Of the 17 participating campuses, 11 were represented by three or more people.

More importantly, responses to this survey indicate that a wide range of activities have been implemented on campuses as a result of the Camp program. Three months later, the schools which sent more than two people are exhibiting more activity in preparing for and using technology. Of the 11 schools which sent teams of three or more, six have planned new faculty development activities for the current school year. Two have commissioned new technology planning committees, and three have asked Apple to help them run their own Camp Apples next summer. Two of these eleven schools have not had any kind of significant follow up. Of the 42 attendees, four papers/research/presentations proposals have been prepared in the four months following the experience. Eighteen faculty have indicated that they would like to return to staff Camp Apple 2000. Additional follow-up is planned at the end of the academic year to further examine the ongoing effects.

Camp Apple was a model professional development experience for many reasons. But perhaps the most significant one is that it truly represents a partnership. Apple provided the resources and opportunities for learning, and in return, many faculty members have followed up with outstanding activities which have extended their learning to students, other professors, and to other institutions.

References

Cooper, J. M., & Bull, G. L. (1997). Technology and teacher education: Best practice and recommended directions. *Action in Teacher Education, 19*(2), 97-106.

Hall, E., Louckes, S. F., Rutherford, W., & Newlove, B. W. (1975). Levels of use of the innovation: A framework for analyzing innovation adoption. *Journal of Teacher Education, 1*(26), 52-56.

International Society for Technology in Education. (1999). *Will new teachers be prepared to teach in a digital age?* Santa Monica, CA: Milken Exchange on Education Technology.

National Center for Education Statistics. (1999). *Teacher quality: A report on the preparation and qualifications of public school teachers* (NCES 1999-080). Washington, DC: U.S. Department of Education.

National Council for Accreditation of Teacher Education. (1997). *Technology and the new professional teacher: Preparing for the 21st century classroom*. NCATE. Available: http://www.ncate.org/projects/tech/TECH.HTML [1999, 5/30].

Office of Technology Assessment, U.S. Congress. (1995). *Teachers and technology: Making the connection*. Washington, D.C.: U.S. Government Printing Office.

Orlando, F., & Levy, L. (1998). *Tools for teachers*. Dubuque, IA: Kendall/Hunt Publishing Company.

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (1990). *Teaching in high-tech environments: Classroom management revisited. ACOT Report #10*. Cupertino, CA: Apple Classrooms of Tomorrow Advanced Technology Group, Apple Computer Inc.

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology: Creating student centered classrooms*. New York: Teachers College Press.

Schrock, K. (1999). *WebQuests in our future: The teacher's role in cyberspace*. Available: http://school.discovery.com/schrockguide/webquest/webquest.html [1999, 11/28].

Thompson, A. (1999). Technology in teacher education: Our time has come. *Journal of Computing in Teacher Education, 16*(1), 2-3.

VISMT. (1995). *Vermont's results-orientated program approval process: Evaluation by portfolio* : Vermont Institute for Science, Math & Technology.

Willis, J. W., & Mehlinger, H. D. (1996). Information technology and teacher education. In J. Sikula (Ed.), *Handbook of research on teacher education* (2nd ed., pp. 978-1029). New York: Macmillan Library Reference USA/Simon & Schuster Macmillan.

Wright, P. (1993). Computer education for teachers: Advocacy is admirable but role modeling rules. *Technology and Teacher Education Annual*, 374-380.

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The Unified Elementary ProTeach Program: Impacting UF and Beyond

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Abstract: The Unified Elementary ProTeach program at the University of Florida is a new teacher education program with the potential to positively impact future teachers, public school children in the state of Florida, the UF community and beyond. The explicit and implicit use of technology is one of the program highlights dramatically affecting the teaching and learning environment for students and faculty in the College of Education. Several examples of changes in faculty and students are explored. Another major component of the program is the integrated teaching block students are experiencing. Faculties from the Colleges of Education and Liberal Arts and Sciences will team-teach academic areas and teaching methodologies. As the faculties of both colleges work together to improve the educational experience of teacher education students, the College of Education faculty have the potential to influence the teaching methodologies of the faculty from the College of Liberal Arts and Sciences.

Introduction

Walk through the halls of the College of Education at the University of Florida and you will hear conversations ranging from the use of electronic portfolios to how special populations benefit from a specific teaching strategy. The event triggering all this excitement is the beginning of the Unified Elementary ProTeach program for elementary and special education majors, which is a restructuring and revision of the original ProTeach program.

In the early 1980s, the College of Education faculty recognized that teacher preparation needed to drastically change. Classroom conditions faced by teachers are more complex and stressful than those in the past and teaching continues to become more difficult. Hence, faculty members developed a program to prepare teachers in elementary education, special education, early childhood, and secondary education titled ProTeach (from PROfessional TEACHer). This rigorous 5-year program was designed to culminate in a Master of Education degree. Since the implementation of ProTeach in 1984, hundreds of new teachers have been produced and hired in the state of Florida.

The Unified Elementary ProTeach Program

Regardless of the success of the ProTeach program, the teacher education faculty again recognized the need for a new conception of teacher education to meet the challenges posed by an increasingly diverse student population. The reexamination and revision of the preservice teacher education programs in elementary education and special education was prompted by factors such as the changing character of the U.S. population of school children (New Faces at School, 1991), the number of students with disabilities served primarily in general education classrooms (U.S. Department of Education, 1994), and the potential of inclusive education policy (Will, 1986). The College of Education has unified and restructured the special education and elementary education programs into a Unified Elementary ProTeach program which is designed to prepare teachers with a dual emphasis in elementary education and mild disabilities. Students who successfully complete the 5-year program will receive a recommendation for certification in elementary education, an ESOL endorsement, and an option for special education certification.

The Unified Elementary ProTeach program accepted its first cohorts of students in the fall of 1999. Although the program is successfully underway, there are still implementation issues needing

discussion and planning. One of the components of the Unified Elementary ProTeach program requiring considerable work is the integration of technology into the program. The faculty has made the explicit and implicit use of technology a program highlight. Faculty are focusing on the best ways to use technology in each course and to insure that students are observing effective methods of teaching and learning with technology. A second major component of the program is the integrated teaching blocks students will experience. Faculties from the Colleges of Education and Liberal Arts and Sciences will team-teach academic areas and teaching methodologies. These two innovative components have the potential to positively impact ProTeach students, the school population in the state of Florida, and the faculties in the Colleges of Education and Liberal Arts and Sciences. This paper will chronicle the process of the faculty as they strive to become outstanding models of integrating technology into their teaching, the changes in the students as they incorporate technology into their learning experiences as well as their teaching, and the impact the infusion of technology into the Unified Elementary ProTeach Program is having on the rest of the University of Florida.

Faculty Development with Technology

Data from over a decade of research from the Apple Classroom of Tomorrow (ACOT) research project indicates that teachers progress through five stages (entry, adoption, adaptation, appropriation, and invention) in their pursuit of integrating technology into their teaching (Sandholtz, Ringstaff, & Dwyer, 1997). While other stages have been identified (Becker, 1994; Berson, 1996), it is indisputable that it takes time for teachers to become effective technology users in the classroom. Hence the College of Education is using a variety of techniques to facilitate the learning process for all college faculty, and specifically, the faculty involved in the Unified Elementary ProTeach program. The Office of the Dean, educational technology faculty, College of Education technology committee, and the Office of Instructional Resources at University of Florida are using numerous strategies to provide the needed training. Brown bag lunches, workshops, individual consulting, and partnering with educational technology graduate students are just a few ways faculty are learning new technology skills and experimenting with previously learned skills in their teaching. The diverse methods of faculty development allow individuals to progress at a rate that is comfortable for their movement towards effective use of technology in teaching. The goal is for the faculty in the College of Education to be technologically fluent so that effective and appropriate modeling of the use of technology during instruction can take place. Being computer literature is not enough since there are additional issues involved in the use of technology in instruction. As a result, conversations are taking place about how to integrate the use of technology into teaching and how the role of the instructor and student changes.

The use of electronic portfolios is another area where faculty are becoming acquainted with technology in the learning environment. In order to comply with the Florida Department of Education documentation requirement for the state Accomplished Practices and to assist ProTeach students with developing a richer understanding of learning and assessment, the faculty has adopted the standard of students creating electronic portfolios. This also requires considerable conceptual and technical training for the faculty.

For a majority of faculty in the teacher education program, the first step in the implementation of electronic portfolios was to consider the various methods in which students could present their materials for documentation purposes. For example, to document that students have performed certain teaching strategies in a classroom, students were previously videotaped. Now students could using digital recorders or digitize videotape as another technique to include in their portfolio. The faculty must make sure students are aware of the wide array of methods to demonstrate the Florida Accomplished Practices and then provide instruction on how to accomplish the task. Faculty agreed that everyone could not learn how to implement each task due to factors such as time constraints and lack of equipment. Hence, instructors are primarily relying on educational technology graduate students to provide student instruction. Still, faculty members are learning to create various electronic portfolio elements. The College of Education faculty are adamant that we demonstrate to students that we are life-long learners just as they should be. Students can see that learning how to use different types of technology and that incorporating technology into teaching takes time and is a long-term commitment. By observing their peers and the College of Education faculty, students are seeing Rogers' (1995) diffusion theory in action.

The Impact of Integrated Technology on Students

As faculty are incorporating more technology into the classroom activities and are modeling teaching with technology, students' expectations for faculty and themselves are changing. The Unified Elementary ProTeach students have become accustomed to a great deal of electronic communication among the instructor and their peers. The use of email, bulletin boards, and web pages for dissemination of information and discussion of course materials and issues are commonplace and expected by students in a majority of their classes. Students are also requesting easy access to class instructional and activity materials, such as Power Point presentations, web sites, AppleWorks projects, HyperStudio stacks, and MicroWorlds projects. We are seeing this reciprocated when students give presentation and create lessons for their assignments and field placements. Students are discovering that when giving a presentation or teaching a lesson to a class reserving a traveling computer cart for a room that is not technology-equipped can be problematic. We have so many faculty and students requesting mobile computing carts for their classrooms that the college runs out of equipment. This will continue to be problematic until the renovation of the College of Education is completed.

Another change for students in the College of Education is their creation and use of electronic portfolios. We know from literature (Fogerty, 1996; Porter & Cleland, 1995) that portfolios allow students and faculty to express their strengths and understanding of concepts in a richer way along with encouraging reflection and collaboration among peers. Electronic portfolios are also a method students can provide districts with proof of mastery of Florida's Accomplished Practices as well as developing various products demonstrating their preparedness to teach.

Before a full-scale implementation plan was established, a pilot study using electronic portfolios was conducted. During this study, students were allowed to present his or her understanding of a task and proof of mastery for a Florida Accomplish Practice using on-traditional methods. Students in the pilot study had vastly different technical skills allowing novice and advanced computer users to be challenged. As students began to share ideas with each other and specific faculty members, the work of the students improved. Novice computer users began to learn from the advanced computer users and became excited at the potential of the electronic portfolio. Advanced computer users were constantly trying to find new computer techniques to implement their ideas. Several students incorporated videos into their portfolios. Frequently, students went beyond the scope of the assignment to add scanned pictures, animation, and reflection pieces to their assignment. In addition, the conceptual quality of the work improved as students began to demonstrate a deeper and richer understanding of the content. This finding is supported by literature (Kent, 1997). The instructor of the class noted that students expressed satisfaction in creating a product that would continue throughout their college career and beyond. This excitement is now spreading to faculty and students who were not involved in the pilot study.

Faculty members are discussing with students how to present evidence of mastery on the Florida Accomplished Practices. As mentioned earlier, it is critical that students learn from faculty that electronic portfolios allow multiple methods of expression. One concern for students is answering the question "Who will assist me in this process?" To provide assistance and instruction for students, a graduate student in the educational technology program developed a series of workshops and a help center web site for ProTeach students. Students were provided with three multiple-hour long seminars to create their initial web pages. As seen with the faculty, there was a wide array of ability levels among the students. Students also were given web sites to see samples of various methods of documenting each of the Accomplished Practices. These examples are separated by academic specialization area since a mathematics specialist might want to document a requirement differently than an English specialist. In addition, the doctoral student holds substantial office hours so students can have individual consulting when they encounter difficulties.

Faculty members are noticing differences in our students as they expand the integration of technology into their educational experience. First, students are beginning to view course content with a different perspective. Students consider the assignments in classes as more significant since they can see how this task truly relates to a valued teacher preparation experience. In the past, there was a tendency for some students to naively think that these assignments could be done with a half-hearted approach since it was just a college activity. Now, students are looking at how each assignment will impact their future job opportunities and experience. The idea of placing as many artifacts into the electronic portfolio as possible to demonstrate mastery of an Accomplished Practice is important to many of the students. Second, students are beginning to develop lessons that are becoming more technology-rich than the lessons of the past. Third, students are starting to recognize that the role of the teacher changes as technology is

integrated into daily teaching. It is encouraging to hear discussion in the hallways dealing with how technology-rich lessons could be implemented and the most effective strategy and role for the teacher in the lesson.

Impacting the University of Florida Community and Beyond

The University of Florida teacher education faculty realizes that the diffusion process occurring with respect to technology is not unique. Teacher education programs across the United States and globe are increasingly integrating the use of technology into the curriculum. However, the senior year experience in the Unified Elementary ProTeach program is distinctive and innovative. ProTeach students will have two semesters where their academic content classes and curriculum and methodologies classes are team-taught with faculty members from the Colleges of Education and Liberal Arts and Sciences. ProTeach students will take an integrated block of science, mathematics, and technology during the fall semester and an integrated block of language arts, social studies, and special education during the spring. Each semester, students will have a field placement experience in surrounding schools. As the faculties of both colleges work together to improve the educational experience of the ProTeach students, the College of Education faculty have the potential to influence the teaching in the College of Liberal Arts and Sciences. It is hoped that best practices in teaching will be seen throughout the University of Florida. In addition, it is hoped that these experiences will dramatically impact the public schools where the ProTeach students are placed. Conversations are taking place with the deans of the two colleges, department chairs, and the professors teaching the courses dealing with the content needed by the Unified Elementary ProTeach students and the modeling of effective teaching techniques for these students. We desire our students to constantly have best practices modeled to them and for them to acquire a strong foundation in content areas. A major element of these discussions involves the effective use of technology into daily teaching. Currently, the fall semester schedule allows for the team teaching of the science, mathematics, and technology areas. This structure has been established so professors from the Colleges of Education and Liberal Arts and Sciences can participate in all the classes. In addition, if one professor needs additional time for a lesson or series of lessons the block schedule allows for this. Another benefit of this scheduling is that students have extended time for their field placement experiences. The spring semester is similarly developed but contains a separate course devoted entirely to a field placement. This course has students in a public school classroom throughout the semester. This differs from the fall term where the field placement is a component of the semester block courses.

These two semesters of team-teaching and integrated academic subjects allow for faculty members within the Colleges of Liberal Arts and Sciences to see exactly what types of teaching methodologies are needed by teacher education students. In addition, as these professors have the opportunity to visit schools where students are doing their field placements, they can experience how critical it is for teachers to be well-versed in content and the ability to effectively and appropriately relay information about the subject area. College of Education faculty members benefit from working with experts in the subject matter areas to increase their knowledge and in developing curriculum materials needed in the public schools. The Unified Elementary ProTeach Program is truly allowing faculty from across the University of Florida to grow in new ways.

It is hoped that we will see change in the public school classrooms from the senior year experience. As the ProTeach students go into the classrooms for their field experience, ideas for teaching can be discussed with experienced classroom teachers. As the students and teachers critique lessons together, determine the appropriateness and effectiveness for that particular classroom, classroom learning environments could change. The College of Education faculty hope that this will allow some experienced teachers to gain ideas on implementing technology-rich lessons for their students.

Conclusions

The Unified Elementary ProTeach program has the potential to positively impact the University of Florida community and beyond. As faculty and students increase the integration of technology into the curricula, the learning environment of classrooms at all levels will change. ProTeach students will benefit

from seeing the use of technology modeled in daily teaching. College faculty will increase their knowledge with respect to using technology and in various subject areas as well as gain a greater appreciation and understanding of what colleagues from various parts of the University of Florida are doing. As the Unified Elementary ProTeach program continues, College of Education faculty desire to gain data and knowledge dealing with the changes in student work related to the infusion of technology into their work, how the Unified Elementary students will act as change agents throughout the state of Florida, and how team-teaching with the College of Liberal Arts and Sciences will impact the teaching across the University of Florida system. We look forward to great things!

References

Becker, H. (1994). How exemplary computer-using teachers differ from other teachers: Implications for realizing the potential of computers in schools. *Journal of Research on Computing in Education, 26,* 291-321.

Berson, M. (1996). Effectiveness of computer technology in the social studies: A review of the literature. *Journal of Research on Computing in Education, 28,* 486-501.

Fogerty, R. (Ed.) (1996). *Student portfolios: A collection of articles.* Arlington Heights, IL: SkyLight.

Kent, R. (1997). *Room 109: The promise of a portfolio classroom.* Portsmouth, NH: Boynton/Cook.

New faces at school: How changing demographics reshape American education. (1991). *Education of the Handicapped, 17*(16), 1-4, *17*(18), 1-6.

Porter, C. & Cleland, J. (1995). *The portfolio as a learning strategy.* Portsmouth, NH: Boynton/Cook.

Rogers, E. (1995). *Diffusion of innovations* (4th ed.) New York: The Free Press

Sandholtz, J., Ringstaff, C., & Dwyer, D. (1997). *Teaching with technology: Creating student-centered classrooms.* New York: Teachers College Press.

U.S. Department of Education. (1994). *Sixteenth annual report to congress on the implementation of the individuals with disabilities education act.* Washington, DC: Author.

Will, M. (1986). Educating children with learning problems: A shared responsibility. *Exceptional Children, 52,* 411-415.

Faculty Development and Preservice Teachers as Agents of Change

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Introduction

Recent state legislation in Virginia requires teacher licensure programs to guarantee that graduating teachers are computer literate. Future teachers must demonstrate the ability to operate and integrate technology into the classroom. In an effort to accommodate this mandate, faculty within the School of Education at Virginia Commonwealth University are analyzing the use of technology in courses required for certification. Through this process, faculty recognize a need to enhance their own technology skills, and also acknowledge the importance of modeling effective uses of technology in their own methods courses. However, faculty report obstacles in integrating technology throughout the teacher education curriculum. Reasons include lack of time, lack of knowledge in the operation of hardware and software, and lack of clarity about how to infuse technology into the curriculum. Faculty also realize that infusing technology into courses is not enough; prospective teachers need to practice delivering instruction which incorporates technology into "real-life" experiences with K-12 students.

While there is a call for new teachers who are computer literate, there is also considerable demand to provide avenues for existing teachers to learn about technology. School of Education faculty maintain close contact with practicing teachers by supervising preservice teachers' field-based experiences. Practicing teachers report an increased demand to incorporate computer literacy skills into their everyday teaching, and they are turning to institutions of higher education for assistance. Thus the School of Education is faced with two challenges: to prepare technology literate preservice teachers and to provide technology training and assistance to teachers already in the field.

Grant Implementation

In an effort to assist university faculty with the tasks of incorporating technology into methods courses and modeling effective uses of technology for preservice teachers, a grant was awarded by the US Department of Education. The grant provides 1) funding for additional personnel to provide technology training programs for university faculty, 2) course release time to allow university faculty time to incorporate technology into their current methods classes, 3) portable equipment (laptops) which allow preservice teachers to practice newly acquired computer skills, and 4) a support system for faculty to prepare preservice teachers as "agents of change." As university faculty increase the use of technology in methods courses, a pilot group of preservice teachers are applying this knowledge during practicum and student teaching placements. These experiences provide preservice teachers the opportunity to share their

knowledge with practicing teachers in the field. Additionally, faculty and preservice teachers are working together to design learning activities that address curriculum objectives. This process allows the School of Education to provide technology training to students obtaining initial certification and practicing teachers.

University faculty participating in the grant are charging their students to implement practical, field-based technology experiences. One science education professor is training his students on the use of a computer-based laboratory system and the associated scientific probeware to engage students in investigative science. A national manufacturer, PASCO Scientific has donated teacher's guides, software, and probes. These materials are being used to equip five computer-based laboratory stations in each of two middle schools. There is a faculty liaison with each school who receives load credit for working with the teachers of the school. The teachers hold clinical faculty rank and serve as cooperating teachers for practicum and student teaching placements. A science educator and four secondary science students are working with the science faculty of both schools to infuse this computer based technology into the existing science curriculum in grades 6-8. The preservice teachers are studying the existing curriculum and the computer based activities to determine matches between the two. In addition, they are making suggestions on how to modify current labs to use the probeware to collect, graph, and analyze data. A correlation of the computer-based laboratory activities to the Virginia Science Standards of Learning for grades 6-8 has already been completed.

A Social Studies education professor is having students learn about digital imagery in order to create virtual field trips which can be accessed via the World Wide Web. The instructor's modeling of virtual field trips in a social studies methods class demonstrates the uses of multimedia, hypermedia, digital photography, and scanning devices. His "trip" through an exhibit at a local history museum was posted on a Web site. Students later visited the exhibit allowing them to understand both his decision making and the technical aspects of designing the "trip". The grant funded a technology specialist within the School of Education to assist with this project. During an introductory class session, the technology specialist showed numerous virtual tours of exhibits (dreamscape.com/frankvad/museums.exhibits.html), provided individual assistance for students, and demonstrated how to post trips to a Web site. Students were required to develop their own virtual field trips (http://www.vcu.edu/eduweb/newhomepage/proj.html), and reflect in writing about the following questions:

- How could you effectively use a virtual field trip in your curriculum to expand the walls of the classroom?
- What is the function of your virtual field trip, and how can it enhance social studies instruction?

The objective of this assignment for pre-service teachers is to engage children in activities that stimulate them to imagine realistically a museum exhibit, historical site, or portrayal of a historical event. Students are creating virtual field trips during their field-based experiences, and in particular, with inner-city children who have limited resources and opportunities. Based on an informal student survey, the instructor has decided to implement this project next semester with two classes.

Conclusion

It is a challenge to modify a teacher education program by encouraging university faculty to develop technology skills and devote adequate time, effort, and resources to infuse technology into the curriculum. It is a major task to ensure that preservice teachers graduate technology literate. Receiving a federal grant has provided much needed equipment and resources. The School of Education looks forward to expanding its efforts with more faculty and students.

Faculty Development in Technology For Teachers of English For Specific Purposes (ESP)

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Abstract:

Entering the global market in the age of information, Russia is in desperate need for experts in all areas of economy, highly qualified, competent, and capable of using foreign languages for handling professionally valid information, solving problems, and making reasonable decisions. To produce such graduates, Russian universities must reconsider their foreign language teaching concept. Constructivist university-level ESP teaching requires the instructors to possess certain specific competencies as a part of their technological literacy. These can be acquired through the system of on-site ESP faculty development. The paper considers the current practices of faculty development in technology in Russia=s universities and suggests ways of restructuring it to provide a high quality of university education in the new millennium.

Introduction

The link between faculty development and the quality of higher education makes the former a prerequisite for the latter. Today, while the tasks of the faculty remain basically unchanged and, on top of instructing students, embrace consuming and generating ideas and information, the tools used to fulfil these have changed dramatically. Tons of necessary and useful information simply cannot be produced, stored, retrieved, manipulated, and disseminated without electronic devices: Anew technologies . . . are guiding the information flow@ (Hyerle 1996). The capability to operate these, or *tech-literacy* (Baratta 1990), has become an integral part of literacy in the electronic age. Therefore, Afaculty and students must become literate in the skills of electronic information processing, both to accomplish the tasks of education better@ (Johnston 1986). The main task of Russia=s higher education is to train literate specialists for the national economy that is now entering the free market system; it is based on the revised concept of literacy.

Tech-Literacy in the University Curriculum

In the modern world, literacy is much more than just the skills of reading and writing as it has been traditionally understood:

1. reading should also embrace the skills of referencing and scanning for information;
2. writing is not only fixing what has been said on paper (or on a computer screen) but also engaging certain authoring and presentation skills;
3. such enhanced literacy cannot be exercised today without the skills of using certain types of computer software;
4. literacy in one=s mother tongue is far from sufficient today, when academic and economic success and social mobility greatly depend on one=s literacy in one or more world languages (Goodman 1987);
5. a university graduate should also be able to disseminate the texts he/she has produced not only as hard copies but also - and rather - through the electronic network which also requires certain specific skills, including such sophisticated abilities as using hypertext and multimedia authoring systems.

These activities can be included in the curriculum in two ways: first, as a part of the General Professional and Special Subjects cycle and, second, as a part of the General Humanities cycle. In the first, they either take the format of specific, professionally oriented courses or are integrated into the courses on the core subject. Meanwhile, the enormous potential of the second has virtually been neglected - because of the insufficient technological facilities as well as because of *tech-illiteracy* of the Humanities faculty, including foreign language instructors. This can be changed only through the successful system of faculty development in which the instructors should learn to understand the technology, practice designing and developing technology-based materials, and generate new concepts and ideas

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on using technology in class.

The purpose of this paper is to consider the faults of the system of ESP faculty development in the area of technology in Russia and to suggest ways to bring it to concordance with the today=s needs.

Technology in the Constructivist ESP Classroom

Foreign Language Courses in Russian Higher Education

According to the State Educational Standards of the Russian Federation, a sufficient command of a foreign language is a graduation requirement for majors in any area (other than linguistics) and, as such, is mandatorily included into the curricula of Russian universities. Normally, it is one of the basic European languages, but English that Aoccupies a special position on the world=s market of languages@ (Coulmas 1992) dominates in the non-linguist curricula. The majority of students planning to take up occupations in international business, economics, management, or engineering consider English a good investment and a prerequisite for getting a good job after graduation. Therefore, they take courses in English for Specific Purposes (ESP).

The whole system of ESP instruction at Russian universities has undergone dramatic changes since the drop of the iron curtain; the major transformation was that of students= attitude: from just a graduation prerequisite of no actual importance, ESP became instrumental literally overnight. The wide involvement of computers and the introduction of joint ventures also contributed to motivating students= interest in learning ESP. However, it brought about problems, as well. First, the focus of ESP courses should be switched from passive language skills (e.g., translating scientific texts) on to active communication and information search which required great amounts of linguistic and extralinguistic information to be consumed; second, there was the lack of time, both in and out of class, which definitely limited the learning process and impacted results. The search for effective, efficient, and time-saving ESP teaching/learning techniques made the faculty turn to Intensive Language Teaching methods; so the advent of modern technology into the ESP classroom was predetermined, and the computer, Aan excellent learning device@ (Bork 1982), joined such old-timers as audio, TV, and even video; moreover, it managed to bundle these up in the format of multimedia.

Multimedia Technology in Teaching ESP

The State Standards require that the Russian higher school graduate be able to use a foreign language to converse both in professional and informal settings as well as derive significant and handy information from any source, including printed materials, electronic networks, and other speakers. This actually implies two groups of skills that must be taught on the university level: first, *language (linguistic) skills* based on the knowledge of the language structure and how it should be used for communication and information exchange; and, second, *specific (extra-linguistic) skills* based on the knowledge of the core subject and other areas to be communicated on. Therefore, ESP classes have to be specifically arranged: they are built on the use of professionally significant information which is retrieved from foreign sources and communicated in the foreign language. To be successful, they depend heavily on modern technologies specially designed for language learning.

The multimedia language-learning software has been incorporated into the ESP curriculum for several reasons. Multimedia as the blend of text, video, and audio provides sense-supported introduction of enormous amounts of information. Its interactive form not only stipulates presentation, as in video, but also simulates life-like communication engaging the learner as an active participant. The non-linear structure of presentations (hypermedia) facilitates multiple return to the information. These result in highly effective and time-saving multimedia-based classes. Besides, a student-oriented mode allows customization of learning regimes according to the needs of each student. Finally, its fragmented format supports incorporating multimedia into course units which also enhances the capabilities of constructivist ESP teaching..

Constructivist ESP Classroom

The search for successful ways to teach foreign languages, in general, and ESP, in particular, has been one of the constantly burning problems of Russia=s higher education system. Direct instruction, that results in having students acquire and reproduce factual knowledge and well-defined skills, has its limitations when it comes to

teaching high-level thinking skills (Zahorik 1995). Since the aim of university-level ESP teaching is the active and creative skills of using English in professional settings, the constructivist approach to teaching and learning appears to be of critical importance for securing the high-quality output from the higher education system.

The purpose of ESP teaching is to support acquiring declarative and procedural knowledge of both linguistic and extra-linguistic character: *declarative linguistic knowledge* embraces knowledge of the language structure (grammar rules, vocabulary, etc.) while *procedural linguistic knowledge* includes the skills essential for using the language structure for extraction, verbalization, and communication of ideas (listening, speaking, reading, and writing skills); *declarative extralinguistic knowledge* implies knowledge about professional communication venues, topics, and etiquette as well as of formats and tools used to present professionally valuable information (e.g. knowledge of a company structure, staffing policy, and workplace ethics plus knowledge of the format of a resume and what tools can be used to generate it) while *procedural extra-linguistic knowledge* comprises the skills of using technology for professional communication, information search, and idea presentation (e.g., the skills of generating various documents using special software, the skills of browsing the Internet for some information, etc.)

So, the use of language-learning multimedia supports only one, *the linguistic,* side of ESP classes. The *extra-linguistic* side needs the involvement of electronic sources of information, such as CD-ROM references and the World Wide Web, as well as special types of software capable of manipulating professionally significant information. This software includes word processors with document templates; computer dictionaries; speech recognition systems; machine translation systems; spreadsheets; computer presentation and desktop publishing programs for generating flyers, posters, leaflets, booklets, and slide shows; specific task software, e.g. business card makers, business planners, marketing campaign planners, accounting and finance software, web page generators, etc. To be productively integrated into the constructivist ESP classroom, this requires some sort of specific competence from the ESP faculty.

ESP Faculty Development

Faculty Specific Competence for a Technologically Enhanced ESP Classroom

Understood holistically, Acompetencies are complex combinations of personal attributes enabling the performance of a variety of tasks@ (Preston & Walker 1993). To perform the task of facilitating a highly successful, technologically enhanced, constructivist ESP class, an instructor should actually possess both general and specific attributes: the first comprise the command of English and of language teaching methods as well as of technology and instructional design basics; the second imply a knowledge of the core subject area basics and metalanguage, i.e. the specific terms used, as well as the command of specific software used in the area.

Russian Practice of Faculty Development in Technology

On-site language-teaching faculty development in Russian universities is arranged around one of three focal points: language, teaching methods, or technology. Each course is delivered by experts in the corresponding area, but the courses in technology appear to be the least successful, with the real outcome much lower than planned: the only skills acquired are typing, fundamentals of Microsoft Word and basics of Excel which is obviously insufficient for facilitating technology-enhanced ESP classes. There are several factors that account for this weakness:

1. The primary cause of development course failure is ignoring the needs of ESP faculty in the course curriculum, though the monolithic approach, that assumes supplying the same material for all teachers, irrespective of their particular areas and interests, has proved to be unsatisfactory.
2. Another drawback of the development programs is the inflexibility of technology instructors: having strong engineering background, they unconsciously assume that their faculty students have the innate knowledge of computer basics. This results in sophisticated explanations which are extremely hard for humanities faculty to understand.

3. The last but not the least fault of faculty development in technology is the coaches= ignorance of the specific needs of ESP instructors and of the specific software to be used at the ESP classes. As has been previously mentioned, the result is limited skills. Generally, faculty can do little more than prepare handouts for classes.

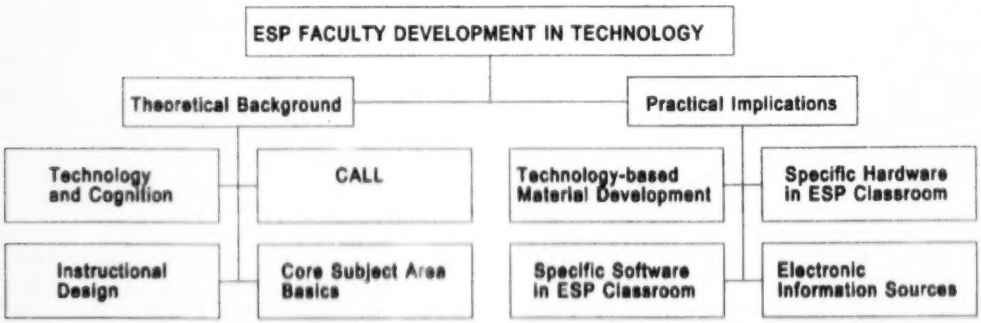
Thus, to rectify the current situation and to significantly improve the ESP faculty development system, it is vital to consider the three weaknesses when designing the course in technology for the ESP faculty.

Constructivist ESP Faculty Development

Constructivist faculty development suggests two basic approaches. The first, classified as psychological (Piagetian), focuses on individualization of the development programs; the second, situational (social), assumes that situated cognition and group interaction (Richardson 1997) is important. Considering these as well as the faults of the current faculty development system, one can conclude that successful on-site ESP faculty development in technology should be *focus-oriented*, which implies arranging the small groups according to the specific area of teaching ESP (e.g. technology in teaching Business English, Geological English, Automotive English, etc.); *task-oriented*, that is providing the faculty learners with the knowledge and skills to be used for doing their specific teaching practice tasks (e.g. how to use a Business Planner in class); *learner-oriented*, i.e. presented in the format that can be easily understood by humanitarians; and *outcome-oriented*, which is helping generate original technology-based course materials, from hard copies to interactive network assignments, etc. that faculty will use.

New ESP Faculty Development Course in Technology

Assuming that the new course should model the manner of involving technology in teaching ESP and thus



help the faculty understand its functions and capacities as well as the conceptional foundations of its use, I would suggest that the course be structured as is shown on (Fig. 1).

Since the course is focus- and task-oriented, it should be delivered by technologically competent ESP instructors assisted by technology and/or field experts. Based on solving the real classroom problems and elaborating usable ESP-teaching materials, the course should offer the faculty learners Aa wide array of learning opportunities@ (Liberman 1995), combining individual experiences and creativity with group collaboration and support.

The Concept of Life-Long ESP Faculty Development

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Tech-literacy of the ESP faculty is not a once-and-forever competence: the acquisition of tech-literacy, as any other knowledge-accretion process, takes long time (Nickerson 1986). New advances in technology that finally enter university classrooms are never ending: to keep pace with technological progress and benefit from it, ESP faculty should enjoy a system of life-long development. This might be shaped as lectures on advanced technologies, such as fiber optics connections and digital TV, demo classes (e.g., in distance education), consultations on new software, and material-development workshops, as well as brainstorming sessions, round-table discussions, new ideas presentations, and journal publishing. The concept of life-long faculty development in technology should therefore become the basis for the ESP Department seminars.

Conclusion

Providing high quality ESP courses today is totally impossible without the wide involvement of modern technologies used both to support language learning and to bring the instruction as close as possible to the realm of students= future profession. This can be accomplished through the implementation of the new concept of ESP faculty development, essentially constructivist, life-long, focus-, task-, learner-, and output- oriented, and flexible in the sense of content. In Russia, such restructuring of the current system of ESP faculty development in technology is vital because it might significantly improve the quality of higher education through teaching students how to use the English language in their professional practices most efficiently and effectively.

References

Baratta, A.N. (1990). The new literacy: a futures prospective. C.Hedley, J.Houtz, & A.Baratta (Eds.), *Cognition, curriculum, and literacy*. Norwood, NJ: Ablex Pub. Corp. 215-223.

Bork, A. (1982). Computer literacy for teachers. R.S.Seidel, R.E.Anderson, & B.Hunter (Eds.), *Computer literacy. Issues and directions for 1985*. New York; London; Paris; San Diego; Saô Paulo; Sydney; Tokyo; Toronto: Academic Press. 91-98.

Coulmas, F. (1992). *Language and economy*. Oxford, UK: Blockwell Publishers.

Goodman, K.S. (1987). On being literate in an age of information. B.M.Mayor & A.K.Pugh (Eds.), *Language, communication, and education*. London; Sydney: Croom Helm in association with The Open University.

Hyerle, D. (1996). *Visual tools for constructing knowledge*. Alexandria, VA: ASCD.

Johnston, J. (1986). *Electronic information: literacy skills for computer age*. National Center for Research to Improve Postsecondary Teaching and Learning.

Liberman, A. (1995). Practices that support teacher development. *Phi Delta Kappan*, 76 (8), 591-596.

Nickerson, R. (1986). Literacy and cognitive development. M.E.Wrolstad & D.F.Fisher (Eds.), *Toward a new understanding of literacy*. New York; Philadelphia; Eastburn, UK; Toronto; Hong Kong; Tokyo; Sydney: Praeger. 5-38.

Preston, B., & Walker, J. (1993). Competency-based standards in the professions and higher education: A holistic approach. C.Collins (Ed.), *Competencies: The competencies debate in Australian education and training*. Deakin: The Australian College of Education. 116-130.

Richardson, V. (1997). Constructivist teaching and teacher education: theory and practice. V.Richardson (Ed.), *Constructivist teacher education: Building new understanding*. London; Washington, D.C.: The Falmer Press. 3-14.

Zahorik, J. (1995). *Constructivist teaching*. Bloomington, IN: Phi Delta Kappa Educational Foundation.

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To Teach How Or To Teach With: Four University's Approaches To Technology Integration For Teacher Preparation

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Abstract: A recent ISTE report provides persuasive evidence explaining the shortcomings of older models of technology education in preparing tomorrow's teachers. New methods and models are needed to successfully prepare teachers to integrate technology in the classroom. The purpose of this interactive panel session is to highlight the models followed by four Colleges of Education at varying stages of the integration process. The Universities represented are: University of Illinois at Chicago, University of Nevada at Las Vegas, Utah State University, and the University of Connecticut.

The rapid influx of hardware and software into public and private school systems has placed sharp demands on teachers to know how to use and how to teach with technology. Yet, year after year, Colleges of Education (COEs) are sending new teachers out under- prepared for this task. As such, COEs are being challenged to re-examine the methods that they use to infuse technology into teacher preparation curricula to provide more information and practice for tomorrow's teachers before they enter the classroom. This is a particularly burning issue for those colleges wishing to maintain their NCATE certification.

The traditional model for technology education centers on a single technology competency course or multiple competency modules. A recent research study put out by the International Society for Technology in Education (ISTE) (Moursund & Bielefeldt, 1999) examined this model of technology integration and found it inadequate. The report clearly states no correlation between formal instructional technology courses and instructional technology utilization by K-12 classroom teachers. Instead the report supports the notion that infusion of technology throughout the entire teacher preparation is the key to classroom technology integration. As such, COEs are scrambling to find space and expertise among classes and faculty to facilitate the transition.

While all COEs are different in some respects regarding technology integration, some types of planning for technology are common across institutions. Technology planning includes equipment acquisition and maintenance as well as professional development activities that guide the integration of technology into teaching and learning. While COE technology plans run the gamut from formal to informal, the same key issues must be addressed by each university planning for the integration of technology into teacher education programs. These issues include but are not limited to:

- **Type of Coursework:** Coursework issues include how to accommodate for core competencies, modeling problem solving and critical thinking using technology, mediating learning/teaching through technology.
- **Technology Teaching Responsibility:** Whose responsibility is it to teach with/about technology? As we ask such questions, we become forced to address a serious issue: Are we asking methods teachers to introduce applications or technology teachers to teach methods?
- **University support:** For technology integration to occur, university support structures must exist. Administration and faculty in colleges of education must collaborate in order to identify and nurture administrative support and commitment to faculty and facilities.
- **Faculty Support:** This issue includes providing faculty with technical support, professional development and compensation for the added workload that they can incur through the technology integration process.
- **Student Support:** Students must also be supported as they use technology in course projects as well as within their practicum experiences.
- **In-service/professional development:** As graduates enter the workforce, the technology support that they recieved as students must be maintained.

While the ISTE report (1999) provides persuasive evidence explaining the shortcomings of older models of technology education in preparing tomorrow's teachers, the report fails to give guidance to colleges of education on methods or models that will lead to increased integration of technology in the classroom. Instead the report advocates that educators share and disseminate their successful models and lessons they have learned along the way. The purpose of this interactive panel session is to highlight the models followed by four Colleges of Education at varying stages of the integration process. The Universities represented are: University of Illinois at Chicago, University of Nevada at Las Vegas, Utah State University, and the University of Connecticut.

University of Nevada, Las Vegas
Neal Strudler, Department of Curriculum and Instruction

Project THREAD (Technology: Helping Restructure Educational Access and Delivery) was funded by the U.S. Office of Education's Preparing Tomorrow's Teachers to Use Technology grant program for Fall 1999. It was designed to build upon and expand the work done in previous years through the integration of technology into teacher education courses and field experiences for preservice teachers (Handler and Strudler, 1997; Strudler, Handler and Falba, 1998). The consortium for this project includes UNLV's College of Education (COE) and the Clark County School District (CCSD). In addition, it involves a new collaboration among various entities at UNLV, the project's lead organization, and a continuing collaboration with a K-8 private school, St. Viator's. The consortium's overarching goal is to to build the capacity of individuals and institutional structures to support the infusion of technology throughout UNLV's teacher preparation program. This is being done through: (a) a series of inservice workshops for university faculty, administrators, field supervisors and mentor teachers; (b) one-on-one follow-up support provided by project staff and advanced undergraduate students; (c) a "mini-grant" program in collaboration with the UNLV's Teaching and Learning Center to support the development of technology-based modules for teacher education courses; and (d) expanded opportunities for students to apply technology in their courses and field experiences.

Project THREAD staff have been working with COE faculty to plan for the integration of technology based on the ISTE/NCATE foundation standards for preservice teachers. A critical component of those standards involves the application of technology in practica and student teaching. The project is addressing this need by beginning to implement a system in which students can request technology-rich field placements. In addition an advanced undergraduate educational technology course will be created to include a field placement with exemplary technology-using mentor teachers.

While Project THREAD's main focus is on professional development, it has enhanced the COE's technology resources via: (a) the purchase of a mobile laboratory of laptop computers for use in courses; (b) the development of an online version of our undergraduate educational computing survey classes; and (c) the availability of CD-ROM based software for checkout for students and faculty.

Overall, Project THREAD is attempting to weave together a mixture of new and existing learning opportunities to prepare preservice teachers for tomorrow's technology-rich classrooms. It seeks to move from "pockets" of

technology integration toward widespread infusion in all aspects of our teacher preparation program. While the proposed initiatives are designed to be carried out within the one-year time frame of the grant, the interventions described mark beginning efforts in what we plan to expand via a further infusion of resources.

University of Illinois at Chicago
Kim Lawless, Department of Curriculum and Instruction
Louanne Smolin, Department of Curriculum and Instruction

In addition to NCATE/ISTE Standards for Technology Competencies, the Board of Education in the State of Illinois has developed additional guidelines for teacher certification programs in the state. These guidelines focus on in context technology application that move beyond technical skill to classroom integration. Challenges presented to UIC were great and included minimal technology infrastructure. Efforts to infuse technology into the education curriculum had to start from scratch.

Initial efforts focused upon the development of a framework that served as a guide for the infusion of technology within teacher certification programs, the acquisition of equipment and professional development . This model was created specifically to accommodate the set sequence of activities that all teacher candidates experience as a part of their program of study. Therefore, it places minimal additional burdens on students, faculty and technology staff.

Since most certification programs at UIC are two year sequences technology integration occurs across four semesters, the students junior and senior years. The model is as follows:

A. **Mandatory general competencies:** General competencies include such applications as e-mail, file systems, etc. This could be a course for as many as three credits or a series of competencies that must be met by all COE students prior to entry into the Junior year of coursework.
B. **Content/domain specific software integrated (Junior and Senior Years):** The methods teachers, facilitated by the technology faculty would model in context use of technology and subject related software applications. This would illustrate a sampling of what technologies are available within specific domains as well as demonstrate appropriate uses of technology.
C. **Culminating experiences (First Semester Senior Year):** Students develop and build a portfolio highlighting technology applications. For example, they can develop webpages, multimedia modules, or webquests. These applications become a part of a portfolio.
D. **Classroom integration project (Second Semester Senior Year):** Students take what they have learned and develop a classroom based project in which technology is seamlessly integrated. They will run this project with their students through their practicum experience.

University of Connecticut
Scott W. Brown, Department of Educational Psychology

The University of Connecticut' Neag School of Education is taking an integrative approach to addressing the standards and guidelines proposed by NCATE/ISTE and the Connecticut State Department of Education as we prepare teachers for the 21st century and provide professional development for inservice educators. The multiple guidelines and standards within an extremely dynamic field have led us to take a dynamic approach to address this challenge.

In addition to the national standards, the Governor of Connecticut has declared that all children will be technology competent by the sixth-grade in the year 2004. He further delineated a three-tier progression through which he expects Connecticut teachers to pass through, reaching the highest level of proficiency, also by 2004. At UConn we are involved in the training of future teachers and the development of inservice training and assessment for Connecticut's current educators. To this end, the United Technologies Corporation has awarded a significant contract to the Neag School of Education to develop training for inservice teachers, develop an opportunity for an on-site MA program in Instructional Media and Technology, and to develop an assessment system for measuring the success of this project. The UTC project specifically focuses on the Hartford Public Schools. Additionally, the new superintendent of schools for Hartford has started "the lap top program" in which 400 laptops were distributed to

selected 9th grade classes across the city. Many of our students will be working with these classes in their practicum and internship activities.

The assessment component of the UTC project involves three levels of the educational technology use. The first level is skill-based but the later two levels employ a problem-based format and portfolio format respectively. Our current students are involved in the development, field-testing and implementation of the assessment protocols. This has been an opportunity to integrate our students in a real problem involving educational technology.

The Teacher Preparation Program at UConn is a five-year program within which students are admitted to the Neag School as juniors and graduate with a B.A. at the end of four years and an MA at the end of five years. Prior to being admitted to the Neag School, juniors will have competed general education requirements, which include a limited number of technology, related courses, designated as C courses. Therefore, as juniors they take an educational technology course in the fall, but this course is integrated across several other courses during the fall semester: two courses in learning, a course in special education, and a seminar that is designed to specifically link the activities that students engage in will in their clinical placements with the course content presented in the above stated courses. These activities are specifically designed to emphasize the education in educational technology. Students engage in activities and projects that focus on the educational impact of technology across the content of the fall courses and provides the basis for further integration across the remainder of their program. As juniors, seniors and MA students, they continue to integrate their educational activities and experiences in a technology rich environment. Our courses and programs stress the integration of education and technology to solve problems and address the challenges and issues of providing the optimal educational environment for all students.

In order to achieve our goals, we have instituted professional development for all Neag faculty and staff involved in teacher preparation, we have raised the expectations of integration of educational technology in our own educational activities, and we have formed a school-wide advisory committee to develop the support structures necessary to meet our goals and provided them a funding basis to reach these goals. We have initiated an electronic portfolio process for our MA students in which their materials will be pressed on a CD for review by a faculty committee and also used to demonstrate proficiency as a teacher and as a proficient user of educational technology. The portfolio system is modeled after the national and State standards. Current plans include the expansion of the professional development to all Neag faculty and staff.

Utah State University
Steve Soulier, Department of Instructional Technology

The Department of Instructional Technology at Utah State University has been recognized as a leader in the field of instructional design for over 25 years. More recently however, the department has had to adopt a new mission, that of facilitating the use of technology in teaching throughout the College of Education. This has not been an easy task, but changing state and national technology initiatives have made it a must.

In an effort to prepare out standing teachers to use technology in mostly rural setting, the department has faced many logistical problems. Time and location constraints have made the delivery of instruction to many willing students difficult at best. As such, USU had to move to a distance-based model of teacher/technology training. Full distance education programs in educational technology and media endorsements were implemented in the fall of 1996. The programs are a mix of two-way interactive video, satellite broadcast and web delivery systems. Students meet in cohort groups around the state weekly to work on class projects and receive instruction.

The first cohort group within these programs has now graduated and students are now working throughout the state in technology related teaching positions. While the program can certainly be considered a success, a number of lessons were learned from the first technology cohort. First, the lack of standard equipment at the various sites made some of the more technical coursework difficult at best. Future cohorts will need to purchase personal equipment at program onset. Additionally, management over a number of the sites through the Internet proved challenging with server failures and lack of student support at the sites. These concerns and others will be discussed as part of the presentation.

References:

Handler, M.G., & Strudler, N. (1997). The ISTE foundation standards: Issues of implementation. Journal of Computing in Teacher Education, 13(2), 16-23.

Moursund, D., & Bielefeldt, T. (1999). Will new teachers be prepared to teach in a digital age? A national survey on information technology in teacher education. Santa Monica: Milken Exchange on Education Technology.

Strudler, N., Handler, M.G., & Falba, C.J. (1998). A systematic approach for implementing the revised ISTE foundations: Dreams and realities. Journal of Computing in Teacher Education, 15(1), 16-23.